

March-April, 1958

**35¢
CDC**

Workbench

How To:

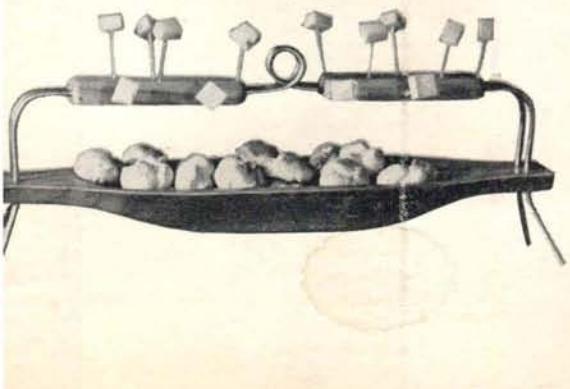
Cut a New Door
in a Wall

Build a Small
Greenhouse

Inlay Wood
Turning

Recover a Sofa

**Plans for a
Boat Shaped
Appetizer Server**



Build This
Modern Lamp
for '7.49



Why you need every feature of these

NEW UNIVERSITY FOLDED-HORN ENCLOSURE KwiKits



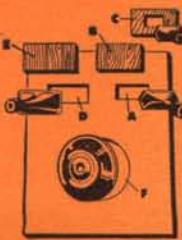
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Because... in performance, mechanical design, construction and ease of assembly, these new KwiKits are unquestionably the very finest enclosure kits—at any price!

KEN-12 For 12" speakers & systems \$44.75
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USER NET

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Adapter for mounting 12" speakers in KEN-15. \$1.50 User Net

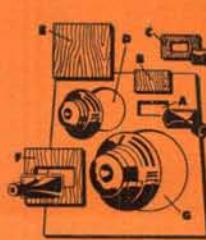
KWIKITS...THE PERFECT COMPLEMENT FOR P.S.E.*



- A—Hole cut out for HF-205.
- B—Blank plug supplied when tweeter isn't used.
- C—Adapter supplied cut out for UX-TS.
- D—Hole cut out for H-600 horn.
- E—Blank plug supplied.
- F—Takes 312, UXC-123, Diffuscone-12, UXC-122, Diffaxials, 6200, 6201 wide-range speakers and C-12W woofers.

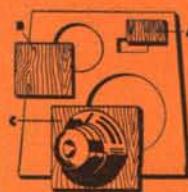
MODEL KEN-12
takes any 12" wide-range or woofer cone
speaker and any tweeter or mid-range speakers.

* University's Progressive Speaker Expansion Plan



- A—Hole cut out for HF-205.
- B—Blank plug supplied when tweeter isn't used.
- C—Adapter supplied cut out for UX-TS.
- D—Hole cut out for C-BW, Diffuscone-8 or 308.
- E—Blank plug supplied.
- F—Adapter supplied cut out for H-600 horn.
- G—Takes 315-C, 6303, Diffuscone-15, Diffaxials, and C-15W, C-63W woofers.

MODEL KEN-15
takes any 15" wide-range or woofer cone
speaker and any tweeter or mid-range speakers.



- A and B—Blank plugs supplied.
- C—Takes 312, UXC-123, Diffuscone-12, UXC-122, Diffaxials, 6200, 6201 wide-range speakers and C-12W woofers.

MODEL KEN-15
takes any 12" wide-range or woofer cone speaker
when 12" adapter board (optional) is used.

SEE YOUR DEALER TODAY.

Send for your free copy
of University's new
KwiKit brochure. Write Desk H-1

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LISTEN

University sounds better



Our Fights Have Turned to Kisses!

I T'S hard to believe that my wife and I used to fight. She would start nagging at me the minute I got home from work and I would snap right back at her! We argued and bickered so often that we suddenly realized our marriage was breaking up! There wasn't any real reason for it except that both of us always felt so tired that we got on each other's nerves!

Our family doctor gave us some advice that probably saved our marriage. Many people, he told us, become run-down and over-tired because their diets do not contain enough vitamins, minerals and lipotropic factors. This could easily cause us to feel worn-out, tense and short tempered.

To correct this condition, each of us started taking Vitasafe High-Potency Capsules. Before long we had more pep, more energy — and our dispositions improved. Instead of fighting, we were back in each other's arms.

If you or your wife have lost the pep and energy you used to have...if over-tiredness makes you nervous and bad-tempered with the ones you love, you owe it to yourself to try proven Vitasafe High-Potency Capsules.

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cover shipping
expenses of this
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To prove to you the remarkable advantages of the Vitasafe Plan . . . we will send you, without charge, a 30-day free supply of high-potency VITASAFE C.F. CAPSULES so you can discover for yourself how much healthier, happier and peppier you may feel after a few days' trial! Just one of these capsules each day supplies your body with over twice the minimum adult daily requirements of Vitamins A, C and D . . . five times the minimum adult

daily requirement of Vitamin B-1 and the full concentration recommended by the National Research Council for the other four important vitamins! Each capsule also contains the amazing Vitamin B-12 — one of the most remarkably potent nutrients known to science — a vitamin that actually helps strengthen your blood and nourish your body organs. Vitasafe Capsules also contain Glutamic Acid, a natural substance derived from wheat gluten and thought by many doctors to help nourish the brain cells for more power of concentration and increased mental alertness. And now, to top off this exclusive formula each capsule also brings you an important dosage of Citrus Bioflavonoid — the anti-cold factor that has been so widely acclaimed. This formula is so complete it is available nowhere else *at any price!*

WHY WE WANT YOU TO TRY A 30-DAY SUPPLY — FREE!

We offer you this 30-day free trial of valuable VITASAFE C.F. CAPSULES for just one reason. So many persons have already tried them with such astounding results . . . so many people have written in telling us how much better they felt after only a short trial . . . that we are absolutely convinced that you, too, may experience the same feeling of health and well-being after a similar trial. In fact, we're so convinced that we're willing to back up our convictions with our own money. You don't spend a penny for the vitamins! All the cost and all the risk are ours. A month's supply of similar vitamin capsules, if it were available at retail would ordinarily cost \$5.00.

HOW THE VITASAFE PLAN OPERATES TO SAVE YOU MONEY

When you receive your free 30-day supply of vitamins, you are under no obligation to buy anything. With your vitamins you will also receive a handy postcard. If after taking your free Vitasafe capsules for three weeks you are not satisfied in every way, simply return the postcard and that will end the matter. Otherwise, it's up to us — you don't have to do a thing — and we will see that you get your monthly supplies of vitamins *on time* for as long as you wish, at the low, money-saving price of only \$2.78 per month.

AMAZING NEW PLAN SLASHES VITAMIN PRICES ALMOST IN HALF

With your free vitamins you will also receive complete details regarding the benefits of this amazing new Plan that provides you regularly with all the vitamins and minerals you will need. This Plan actually enables you to receive a 30-day supply of vitamins every month regularly, safely and factory-fresh for exactly \$2.78 — or almost 50% lower than the usual retail price. BUT YOU DO NOT HAVE TO DECIDE NOW — you are under no obligation to buy anything from us whatsoever. To get your free 30-day supply and guaranteed opportunity of regular worthwhile savings on your vitamin purchases, be sure to send us the coupon today.



EACH DAILY VITASAFE CAPSULE CONTAINS

Choline	31.4 mg.	Niacin Amide	40 mg.
Bitartrate	31.4 mg.	Calcium	Pantothenate
Inositol	15 mg.	Vitamin E	4 mg.
dl-Methionine	10 mg.	Folic Acid	2 I.U.
Glutamic Acid	50 mg.	Calcium	0.5 mg.
Lemon Bioflavonoid		Phosphorus	75 mg.
Complex	5 mg.	Iron	58 mg.
Vitamin A	12,500 USP Units	Cobalt	30 mg.
Vitamin D	1,000 USP Units	Copper	0.45 mg.
Vitamin C	75 mg.	Manganese	0.5 mg.
Vitamin B ₁	5 mg.	Molybdenum	0.1 mg.
Vitamin B ₂	2.5 mg.	Iodine	0.075 mg.
Vitamin B ₆	0.5 mg.	Potassium	2 mg.
Vitamin B ₁₂	2 mcg.	Zinc	0.5 mg.
		Magnesium	3 mg.

We invite you to compare the richness of this formula with any other vitamin and mineral preparation.

SPECIAL FORMULA FOR WOMEN ALSO AVAILABLE.

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VITASAFE CORP.

43 West 61st Street, New York 23, N. Y.

251

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Send me my FREE 30-day supply of high-potency Vitasafe Capsules as checked below:

Man's Formula Woman's Formula

I ENCLOSE 25¢ PER PACKAGE for packing and postage.

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Address

City Zone State

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IN CANADA: 394 Symington Ave., Toronto 9, Ont. (Canadian Formula adjusted to local conditions.)

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OWN BUSINESS
IN 2 WEEKS—
AT HOME
IN SPARE TIME



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WORKBENCH

volume 14 · number 2

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TOOLS, MATERIALS AND SUPPLIES

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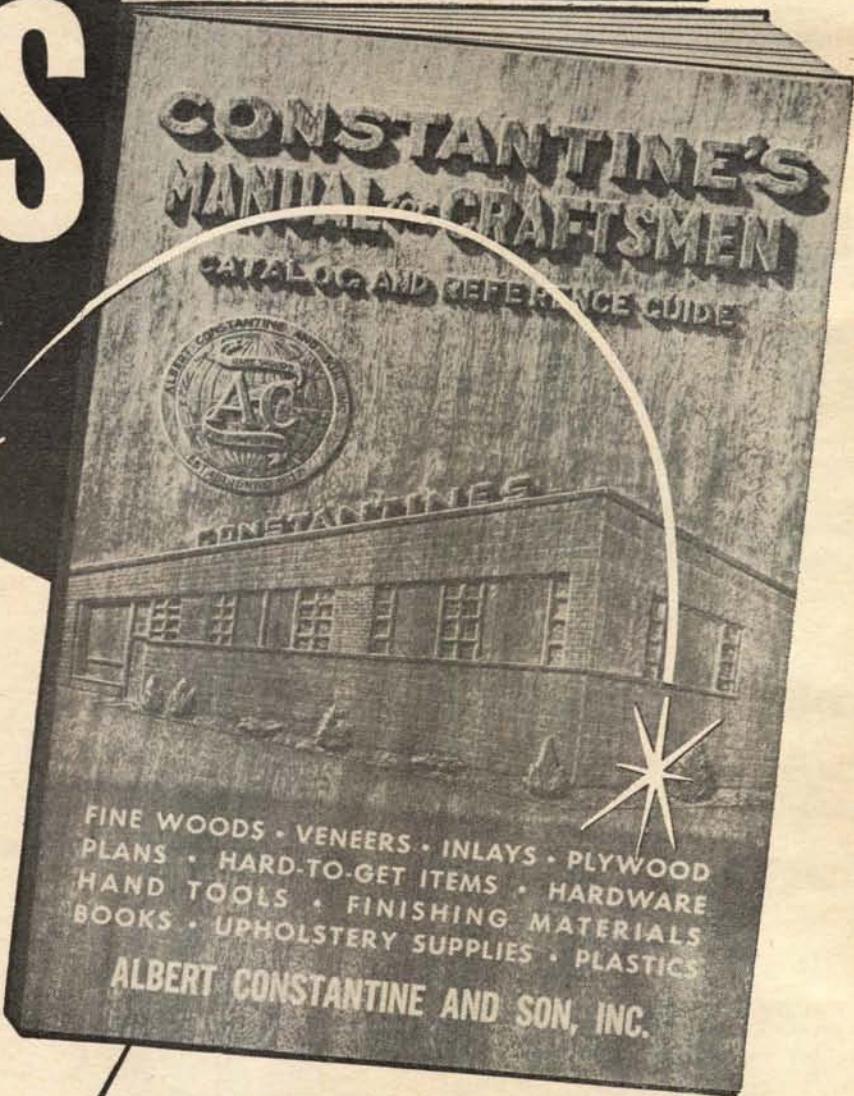
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City..... Zone..... State.....

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keeping up with craft and home products

In communicating with companies whose products are described in this department, please mention WORKBENCH.

Workbench for Home Assembly



A SCIENTIFICALLY-DESIGNED workbench, shipped knocked down for easy assembly using a minimum of tools, has been introduced by Build-O-Bench Co., 45 Layne Pl., San Bruno, California. Two lengths are available, 6 or 8 feet, and each unit is 2 feet wide and 33 inches high. Made of kiln-dried clear Douglas fir, tough Masonite Tempered Preswood for top, drawer bottoms and back, the workbench has eight drawers, and center cabinet space. A 2'x6' "Peg-Board" panel is included for hanging tools on a wall behind the bench.

Assembly instructions are included with each kit. Parts are exactly cut, ready to be fitted together according to numbers marked in the glue joints. No nails or screws are visible when the assembly is completed. An 8-inch overhang at each end will accommodate a vise for either a left or right-handed worker.

Prices: \$56.50 for six-foot unit, \$71.50 for eight-foot, F.O.B., San Bruno, California.

Automatic Garage Door Opener

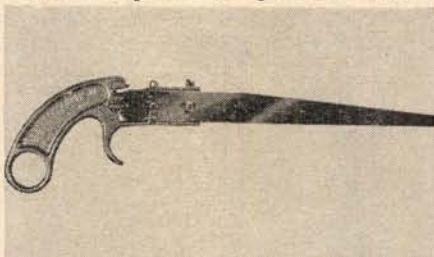
OPERATING ON ordinary 110-volt household current, the Victor Automatic Electric Garage Door Opener works on all types of residential overhead garage doors. The mechanism which raises the garage door is actuated by either a key switch located in a driveway post or a push button switch inside the garage, the house, or any other indoor location. Closing of the door is done manually, and, when closed, the Victor Automatic Electric Garage Door Opener locks the door automatically.

The complete kit retails for \$24.95 and includes the outdoor key switch, an indoor push button switch, the automatic door opener mechanism, a three-year guarantee, and complete easy-to-understand installation instructions. Not included is the post, which many homes already have, and the electrical wire necessary for the installation.

Unlike most automatic garage door openers, which require a carpenter and electrician for installation, the Victor Automatic Electric Garage Door Opener can be installed by anyone because it operates on a simple electro-mechanical principle.

The kit is available at hardware, lumber, and building supply retailers, or, additional information may be obtained by writing directly to Yonkers Industries, Inc., Department C, 28 School Street, Yonkers, New York.

All-Purpose Keyhole Saw



A NEW all-purpose keyhole saw which is designed to cut in every direction has been introduced by Great Neck Saw Mfrs., Inc., of Mineola, New York. Claimed to be made of superior tungsten steel, the blade is ideal for the home workshop and the do-it-yourself expert. A small, compact pistol grip saw which cuts wood, metals, plastics, etc., is uniformly heat treated to withstand severe punishment and is said to be useful in repairing wrought iron furniture and most home repair jobs. The key-hole saw is easy to work with in close areas because of its small 10" over-all size. Teeth are said to be perfectly set, 24 points to the inch and the blade self-locks to the handle in four directions; horizontally, vertically, right or left. Furnished with an attractive gold alloy pistol-grip handle, the saw can be used safely and conveniently by the housewife for small emergency repairs around the house, cutting frozen foods, etc. The 10" size makes it easy to store and use and the blade is simple to

change—no screws, nuts or bolts. Attractive enough to be considered a utensil, this all-purpose keyhole saw retails for only 49 cents and is fully guaranteed.

Large Capacity Lathe



A NEW home workshop lathe styled by famous designers Raymond Loewy Associates, Inc., and manufactured by Rockwell Manufacturing Company's Delta Power Tool Division, provides the largest capacity ever built into a hobbyist's and home craftsman's tool of this type.

The craftsman and hobbyist can do work on this tool that could formerly be done only on industrial type tools. It will turn an extra large piece of wood—up to 14 inches in diameter and 3 inches thick—over a gap in the tool bed provided for this purpose as well as pieces up to 36 inches long and 11 inches in diameter over the bed itself. The extra capacity is particularly useful for the craftsman who wants to turn bowls and discs and similar wide-diameter objects.

The new Delta Homecraft lathe, called the 14/11 because of its 14 and 11 inch capacity, is also rugged enough for light machining of metals and metal spinning—a popular method for shaping soft metal sheets into decorative or useful objects—and versatile enough for dozens of other jobs.

The streamlined Raymond Loewy design, in addition to improving the lathe's over-all appearance, has provided a number of practical advantages including a modern mottled gray stain-proof finish and streamlined pulley drive guard for added safety and neatness.

The new lathe also incorporates

Now You Can Earn Extra Money in Your Spare Time with CASTOGLAS

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If you like to work with new ideas and materials, and if you can use some extra cash . . . you'll be interested in "How To Earn Extra Money in Your Spare Time." This new handbook shows you what others have done, how they got started, what they make. Tells how one man earned \$1800.00 net profit in 6 weeks in his home shop and how you can do the same.

Illustrated Directions Show You How to embed real flowers, brilliant fall leaves, butterflies, sea shells, coins, photos in clear liquid plastic to make novelties, advertising specialties and other fast-selling items. How to laminate translucent glass panels with embeddings of unusual fabrics, grasses, feathers and other interesting materials. How to use these panels for room dividers and screens, or fine lamps, bowls and trays. Also shows a new way of casting tiles and mosaics that is **Really New and Different**.

No Equipment Is Required because neither heat nor pressure are needed . . . just small hand or power tools. This process is made to order for the smaller operator with a garage or basement shop. The same basic materials used for laminating decorative glass panels are also used for repair work. If you are in the right location, for example, you may find your big opportunity "glassing" boat hulls, tanks, pools or develop a specialized, highly profitable industrial maintenance business.



"How to Laminate Glass Panels with Castoglas" illustrates the fascinating art of creating decorative panels of your own design.



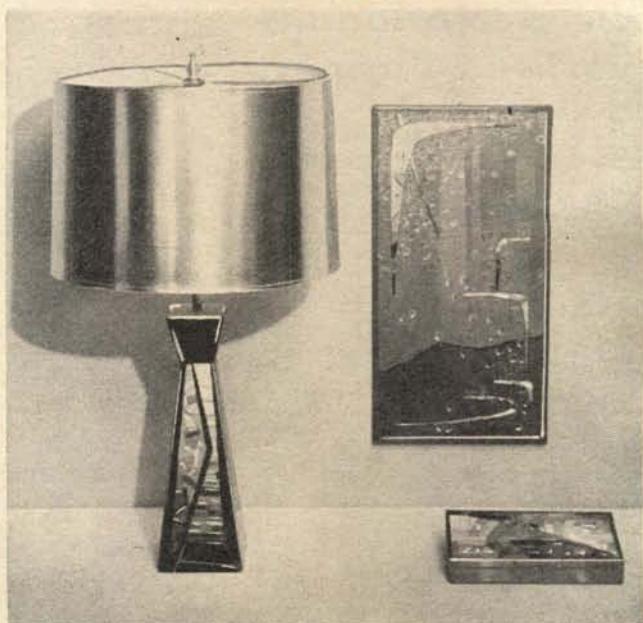
Embedding natural grasses, seahorses, starfish and shells in this glass-clear paperweight continues to be as popular as ever.



Seventh-grade students are pouring colorful tile trays and coasters with liquid Castoglas.



Mosaic inlay in shades of blue-green adds distinction to this walnut table.



You can cast your own mosaics in an infinite variety of colors, shapes, sizes and you can do it without previous experience. Castoglas sets hard within 30 minutes at room temperature.



Key tags make fine gift projects, inexpensive and easy to do. Brilliantly colored fall leaves are permanently embedded in Castoglas.

THREE WAYS TO GET STARTED

1. Order "How To Earn Extra Money In Your Spare Time." This booklet is illustrated with over 100 photographs and gives you a complete over-all view of the entire Castolite program. Send 25c to cover mailing and handling.
2. Order The CASTOLITER Project Series, a set of manuals giving complete illustrated directions for making many items. Learn for yourself how easily you can adapt many of these projects to your own personal requirements and circumstances. The price of \$1.00 for the set includes a copy of "How To Earn Extra Money In Your Spare Time" at no extra charge. The purchase of this valuable set also entitles you to several new project manuals now in preparation.
3. Order the special Commercial Craft Kit if you prefer to get started without further delay. This kit contains Castoglas and Hardener, 5 different colors, fiberglass mat and fabrics, various fillers, spoons, droppers, mixing cups, etc. Also enough clear Castolite to pour 24 key tags and 24 pair earring castings or several paperweights and similar items. The complete CASTOLITER Series and "How To Earn Extra Money In Your Spare Time" are included with the kit, which is priced at \$10.00, postpaid. Write to:

Commercial Crafts Division, Dept. C-9
THE CASTOLITE COMPANY Woodstock, Illinois

The Castolite Co., Commercial Crafts Div., Dept. C-9
Woodstock, Illinois

- Enclosed is 25c for one copy of "How To Earn Extra Money In Your Spare Time."
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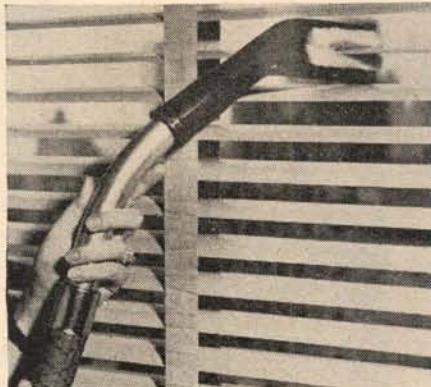
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all the time-tested Delta lathe features including: indexing mechanism built into head stock, graduated tailstock for precision drilling and scientifically ribbed bed to prevent distortion.

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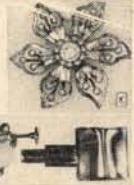
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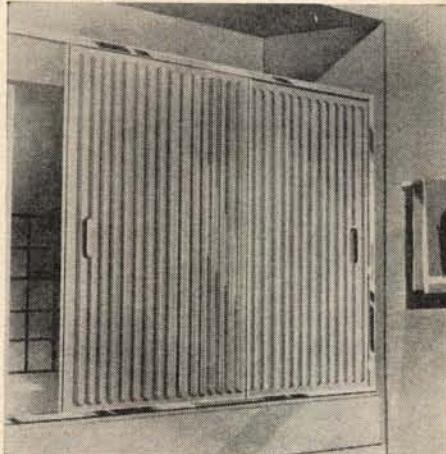
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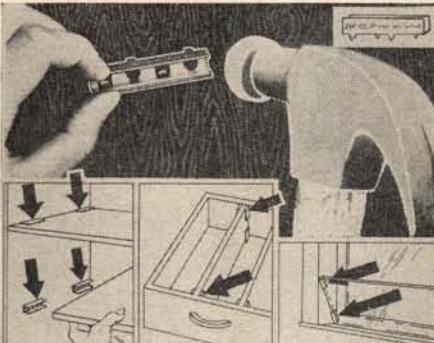
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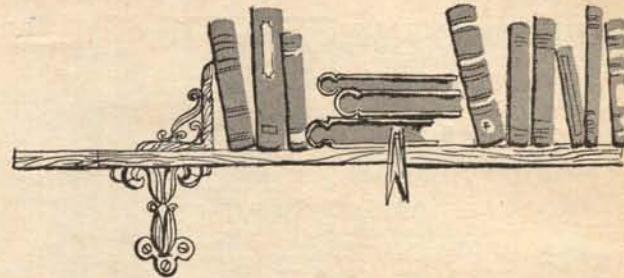
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the craft and home bookshelf

Reviews By Theodore M. O'Leary



Woodshop Tool Maintenance

by Beryl M. Cunningham and William F. Holtrop
295 pages; illustrated; Charles A. Bennett Co.,
Peoria, Illinois; \$7.

WHILE A great deal has been written on how to use both hand and power woodshop equipment, not much has been put into book form on the important subject of maintaining that equipment in good operating condition. To fill this void two industrial arts teachers at the college level have written "Woodshop Tool Maintenance," a big information crammed volume that can truly be called a pioneer work.

Maintenance of woodshop equipment, in the words of the authors, includes the proper adjustment and care of tools, reconditioning and sharpening of cutting edges, replacement of tools and parts, periodical lubrication, the repair of worn parts and the installation of new equipment. The authors believe that regardless of the good quality of your equipment, you cannot obtain good performance unless you become familiar with its construction and can make the necessary adjustments. In addition to impairing efficiency, poorly adjusted equipment can also cause accidents.

"Any one who is capable of learning to perform the operations for which the equipment is built, can just as easily learn to maintain it," the authors assert. They grant that the beginner in woodwork may not be able to appreciate some of the procedures and techniques which they give, but as he acquires more skill in the use of the tool, he will find that he will also reach a greater understanding of the processes involved in its maintenance.

More than 400 illustrations are included in this volume. Many of them were created especially for it and show completely new techniques which were worked out by the authors to perform jobs for which no established procedure seemed to exist. As an example, there seemed to be no procedure for gumming circular saws that would give a uniform spacing of the teeth. The authors developed such a procedure and it is illustrated here for the first time. The same was true of a series of photographs occupying seven pages and showing how to fold band saw blades.

PART ONE of "Woodshop Tool Maintenance" deals with hand tools and includes chapters on tools used for

sharpening, maintaining the cutting edge of tools, maintaining hand planes, chisels and gouges, wood scrapers, handsaws, wood bits and such miscellaneous tools as hammers, screwdrivers, drawknives, spoke-shave cutters, scissors and shears, squares, clamps, dividers and vises.

Part two concerns itself with machine tools—the various power saws, lathes, jointers, hollow chisel mortisers, single planes or surfacers, sanding machines and shapers. Separate chapters are also devoted to electric motors, V belts and the lubrication of machines.

The advantages of having between one set of book covers, vast quantities of information which hitherto have been scattered through many volumes, periodicals and pamphlets, etc., are obvious. Adding to the value of the book, of course, are the new techniques developed and illustrated by the authors and the fact that years of experience in the teaching field enable them to convey information clearly and without taking for granted too much prior knowledge on the part of the reader. This is the sort of a book that is virtually certain to pay for itself many times over in better tool performance and longer tool life.

Chip Carving

by Harris W. Moore
46 pages; illustrated; Charles A. Bennett Co.,
Peoria, Illinois; paperbound, \$1.15.

CHIP CARVING is one of the most primitive of arts but one which still today gives the artistically inclined woodcraftsman a chance to express himself. It consists of making angular incisions to enrich an otherwise plain wood surface.

Primitive South Pacific islanders, Harris W. Moore tells us, executed beautiful designs on ceremonial objects, using a bit of shell or a shark's tooth as a cutting tool. Much later in Sweden in the 17th and 18th centuries this style of carving was widely applied to household furniture and implements. A rude knife, made from an old sword or scythe, was often the only tool used.

For the contemporary chip carver Mr. Moore recommends the use of a chip carving knife, a wood carver's veining tool, a parting tool, a skew chisel and a carver's gouge, the latter particularly useful in stabbing flower form rosettes. All the cutting tools should be honed to a keen perfect edge, as you simply can't attain good

results with a dull tool.

Mr. Moore offers instructions in the actual chip carving technique as well as advice on the selection of wood and its finishing. The remainder of his book is devoted to a series of actual size designs for the decoration of articles which lend themselves particularly well to chip carving. They include such things as a glove box, a checkerboard, a pin tray, card case, blotter, pipe rack, handkerchief box, picture frame, wastebasket, paper knives, game boards, whisk broom holder, easel for holding photographs or postcards, a toothpick holder and a black mahogany sewing box cabinet, made and carved by Mr. Moore, a photograph of which is included.

Course in Mosaic Making

by Joseph L. Young
60 pages; illustrated; Reinhold Publishing Corp.,
New York City; \$3.50.

ALTHOUGH THE art and craft of making mosaics is thousands of years old, it is just now enjoying a popular vogue in this country among home craftsmen. Professional artists and craftsmen have been responsible for the great proportion of the mosaic work in America. But now making mosaics has become a definite part of the do-it-yourself movement, Joseph L. Young points out in "Course in Mosaic Making."

"Perhaps," writes Mr. Young, "the art once made by slaves for kings, and once used by the Church for the people, will now become one of the true arts of the people." He goes on to say that almost anybody can do a creditable mosaic if he devotes a reasonable amount of time to learning the craft. Do-it-yourself mosaic kits are now becoming increasingly available. These have both their advantages and their disadvantages, Mr. Young points out, and he offers suggestions on how the disadvantages may be overcome.

For the benefit of beginners, Mr. Young explains just what tools and materials are necessary for making mosaics, including the various types of tesserae (small pieces of marble, glass, stone, etc., which, placed together, make up the mosaic). He also lists sources of these tools and materials. To get started, he suggests that you make a small trivet in mosaic or cover an unglazed ash tray. Then he tells you how to make a mosaic coffee-table by adhering the tesserae to a plywood base, using

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the so-called direct method. He also tells you how to make a coffee table by the indirect method, in which the mosaic design is laid on heavy paper, then transferred to the surface of the table. Then follow detailed instructions for making a wall panel.

Doing a cartoon in mosaic and executing and installing a mural are other projects offered by Mr. Young. He suggests many other uses for mosaics in the home—on fireplaces, in murals, as flooring, on lamp bases, but most of the examples he offers seem rather far beyond the range of the beginner. They suggest, however, goals for which the beginner may strive, as do the several photographs of the mosaic work of such outstanding professional mosaic artists as Gino Severini and Juan O'Gorman.

Receiving Aerial Systems

by I. A. Davidson

152 pages; illustrated; Philosophical Library, New York City; \$4.75.

THIS BOOK on radio and television aerials is not a simple how-to-do-it manual but a searching inquiry into the technical problems involved in the function and use of aerials. Its emphasis, however, is on home installations and for the person with an inquiring mind, who wants to know just how an aerial works, what one type will do that another won't and similar questions, here are the answers.

But this is in no sense merely a theoretical book. The person who reads it and absorbs its contents will gain knowledge which should enable him to improve home radio or television reception to the extent that such reception is governed by the type of aerial in use, its method of installation and similar factors.

Mr. Davidson explains the basic factors that go into an ideal aerial and points out that most of them are dependent on the frequency of the signal being received. He gives some of the aspects of the directional characteristics of aerials and how they influence its performance. He discusses the electrical characteristics of the most widely used types of aerials. He describes types of aerials used for single channel and multiple channel reception, respectively, stressing that when choosing a television aerial, local knowledge of reception conditions is the most useful guide. He discusses the mechanical design of aerials and tells you how to install an aerial, stressing that many of the advantages of a well-designed aerial will be lost if it is installed incorrectly. Finally he looks into the future and suggests that as transmitters continue to increase in power there will be a greater use of indoor aerials. The widespread use of ferrite rods for both indoor and outdoor aerials is an imminent development which will enable much smaller aerials to be constructed, either indoors or outdoors.

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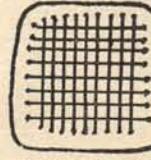


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A Lamp that shines three ways

RONALD L. ANDERSON

With its three swivel shades, this modern "tree" lamp enables you to direct light wherever you want it.

THIS MODERN floor lamp (Photograph 1) uses three "bullet" shades ready-made from Fiberglas that swivel to put the light where you want it. And it's ideal for the small house or apartment because it's scaled down to fit.

The base is nothing more than a 9" stainless steel cake tin reinforced with a hardboard disc on the inside. The "trunk" of this "tree lamp" is a 46" length of $\frac{1}{2}$ " diameter thin wall electrical conduit available from any hardware store, while the swivel fittings are standard lamp parts which are mounted in holes drilled in the conduit. You can buy the attractive molded plastic bullet lamp shades for about \$1 each. Metal shades of the same shape could be used but they tend to get hot when the lights are on.

First step is to drill a $\frac{3}{4}$ " hole in the bottom of the cake tin. Cut a disc from hardboard that will fit inside—about an 8" disc for a 9" pan—and drill a $\frac{3}{4}$ " hole in the center of it, too.

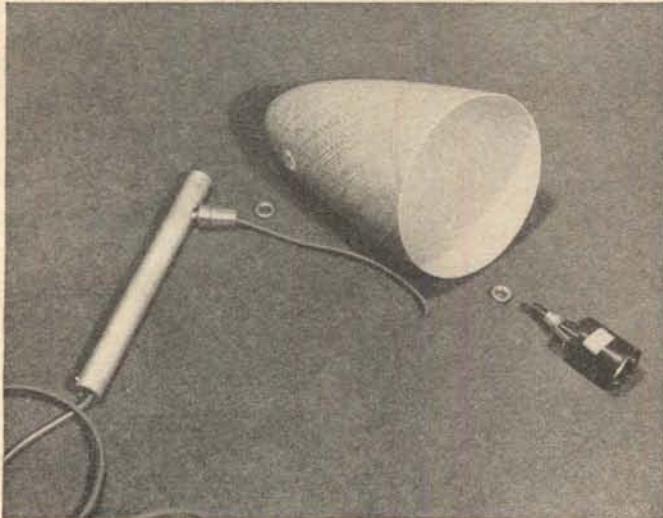
To mount the conduit on the cake tin you'll need a standard $\frac{1}{2}$ " junction box connector of the "crimp" type (Photograph 2). The special crimping tool required can be rented for a quarter or two from the hardware store where you get the fittings.

Insert the connector in the cake tin, through the hardboard disc and tighten the lock nut on the bottom. Drill four small holes in the cake tin bottom, through the hardboard and—using small aluminum rivets—fasten the two together. This serves to "beef up" the bottom of the cake tin and prevents wobbling.

PHOTOGRAPH 1—The approximate cost of this slender modern lamp is only \$7.49 if you build it yourself. Its base is a cake tin.

Materials Needed:

NO.	ITEM	APPROXIMATE COST
1	46" length $\frac{1}{2}$ " thin wall conduit.	\$.50 (\$1.10 for 10' length)
1	9" aluminum or stainless steel cake tin.	.39
3	Plastic bullet shades.	3.00
1	$\frac{1}{2}$ " "crimp" type junction box connector for conduit.	.15
2	$\frac{1}{2}$ " "crimp" type conduit couplings.	.30
1	8" hardboard disc (scrap).	—
1	6" length of $\frac{5}{8}$ " dowel (scrap).	—
3	Standard lamp swivel fittings.	1.05
25'	Rubber or plastic insulated lamp cord.	.75
3	Bakelite sockets (switch on end).	1.05
1	Plug.	.15
4	Aluminum rivets.	.05
2	Solderless connectors for splicing.	.10
Total: \$7.49		



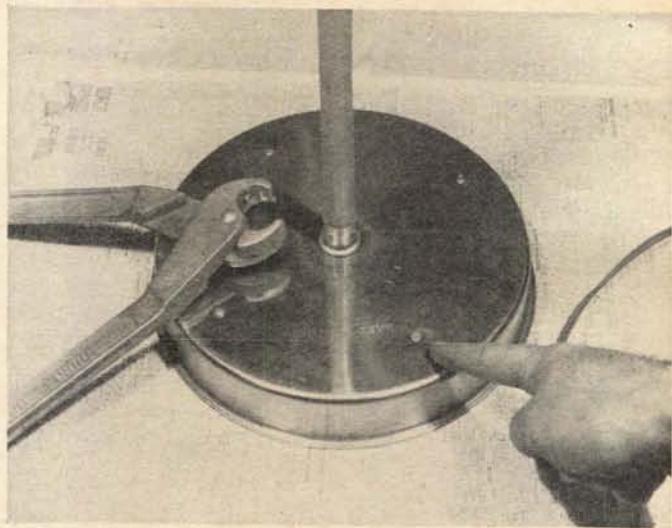
PHOTOGRAPH 3—Lamp is assembled in sections as shown here. Swivel fitting is fastened through hole drilled in conduit section at left with a lock nut on inside and long length of wire threaded through. Glass fiber shade is drilled on side and fastened to swivel with a short piece of $\frac{1}{2}$ " threaded pipe and a lock nut. Socket at right goes through hole in top of shade and also is fastened with a lock nut.

Next, cut the 46" length of conduit into three sections to make it easier to secure the swivel fittings to the conduit with lock nuts on the inside. At this point the lamp cord should be threaded through each swivel, the swivel attached to its particular conduit section, and the lamp cord threaded down through (Photograph 3).

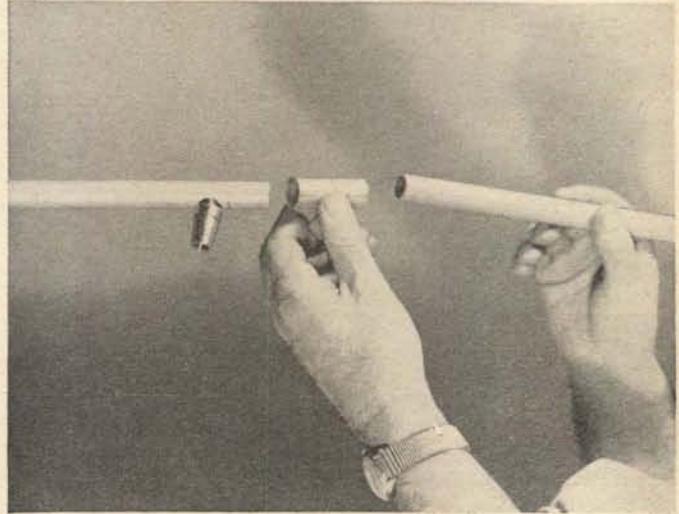
Allow enough cord from each bulb so that all three can run all the way down to the base and be joined there. This takes more wire, but making the splices at the base of the lamp is easier and safer than making splices inside the tubing. Then tighten the swivel fittings securely.

Next assemble the sections of the lamp, using standard $\frac{1}{2}$ " "crimp" type conduit couplings (Photograph 4), threading the wires down through as you go. Inside the base of the lamp, take one of the two wires from each of the three cords and join them together. Then take the remaining wire from each of the three cords and join them together. This gives you two leads to which to connect a 10' length of lamp cord and a plug.

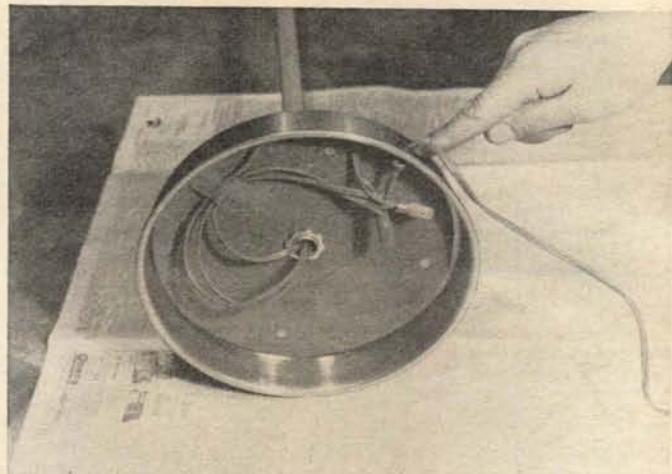
Drill a $\frac{1}{4}$ " hole in the side of the cake tin, insert a rubber grommet, and run the cord through, tying a knot on the inside first (Photograph 5). The plug goes on last.



PHOTOGRAPH 2—Base for the lamp is a 9" aluminum or stainless steel cake tin reinforced by an 8" hardboard disc riveted to the inside. The conduit "trunk" of the tree lamp is mounted in a standard "crimp" type junction box fitting in the center of the pan. Tool at left, which can be rented from a hardware store, does the crimping.



PHOTOGRAPH 4—This shows how "crimp" type conduit coupling is used to rejoin the sections of the lamp after the swivel fitting is in place.



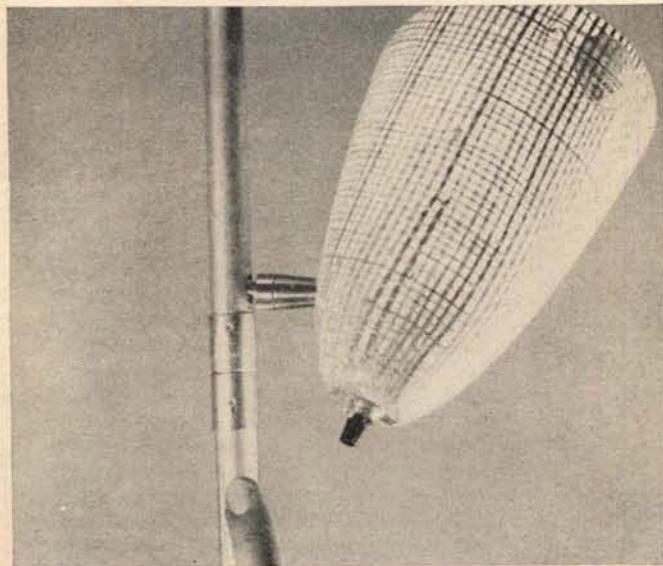
PHOTOGRAPH 5—Bottom view of base of finished lamp shows wiring, lock nut on connector and also hardboard disc riveted in place to strengthen lamp and prevent wobbling.

Incidentally solderless connectors of the screw-on type provide an easy method of making good tight splices in the base. Otherwise the splices must be soldered and taped.

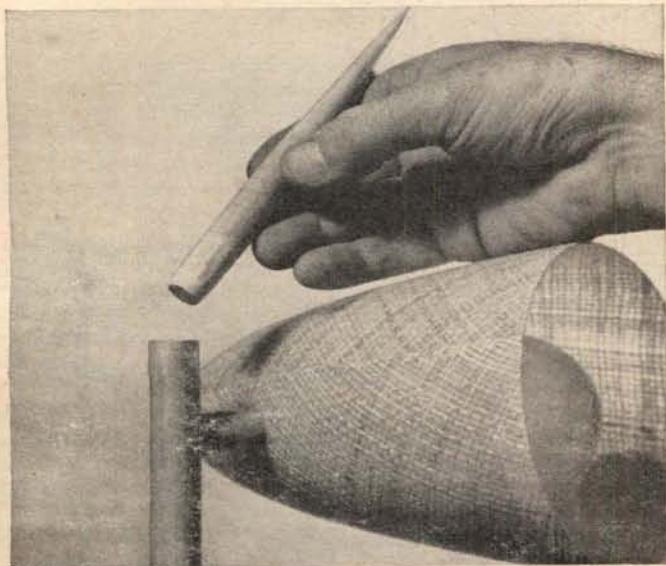
Now come the shades. These come with a hole drilled in the top for a bakelite socket with a rotary switch on the end. Drill an additional hole in the side of each shade for attaching to the swivel fittings (Photograph 6). Attach the wires to the terminals on the sockets and fasten the sockets in the shades.

The top piece is simply a 5/8" dowel trimmed to fit inside the conduit and tapered to a point (Photograph 7). Sand it well and seal the wood with shellac. Model airplane cement or other adhesive can be used to hold it permanently in place.

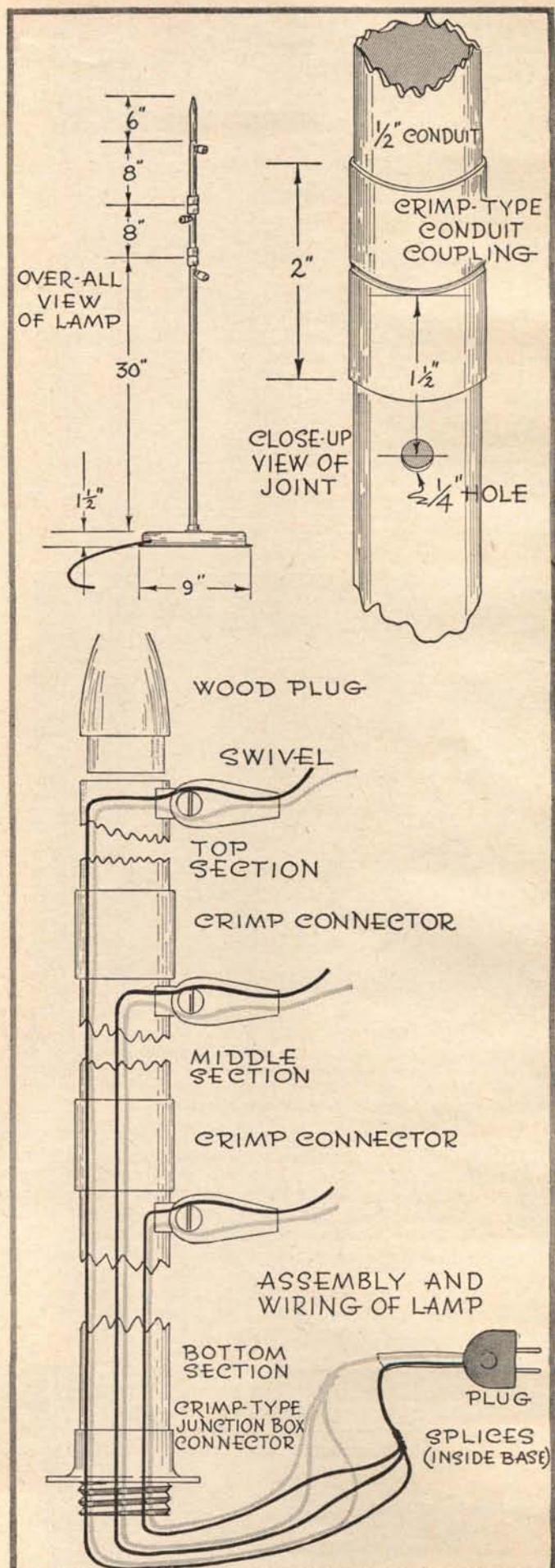
Spray paint from a pressurized can provides an easy method of painting the completed lamp. A flat enamel, such as wrought iron black, gives the best finish. Be sure to mask the shades and brass fittings first, however.



PHOTOGRAPH 6—Result of using "crimp" type couplings is shown here. With a coat of flat paint they are hardly noticeable and do not detract from appearance of finished lamp. Hole has been drilled in side of shade for attaching it to the swivel fitting.



PHOTOGRAPH 7—Last step is to taper a dowel and cement in place at top end of conduit. Flat spray paint from pressurized can provides an attractive finish.

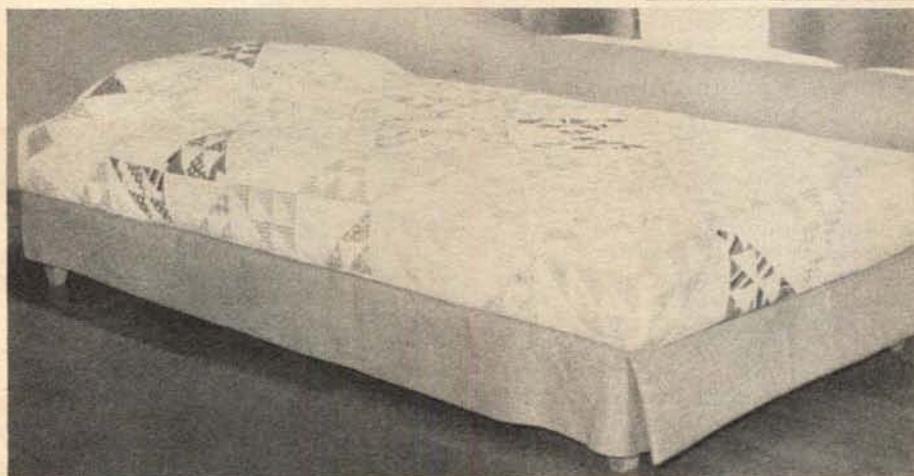
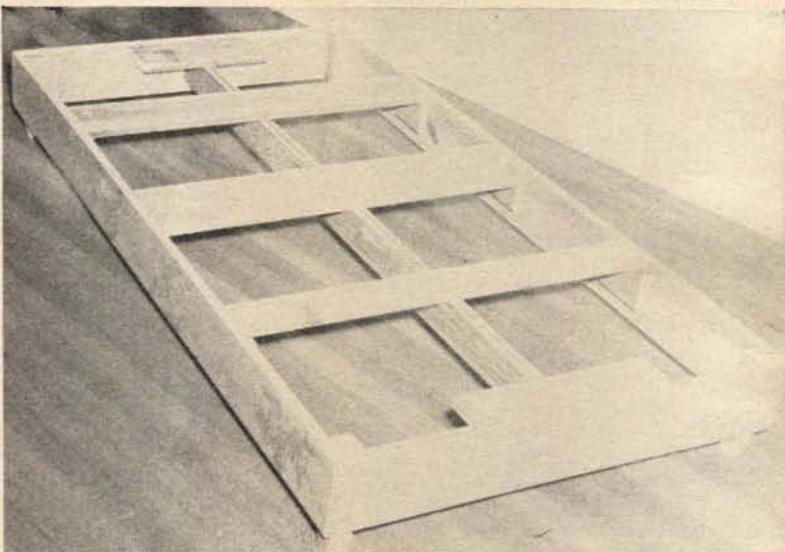


When too many people come to visit do you end up sleeping on the floor? Here's something you can do about it.

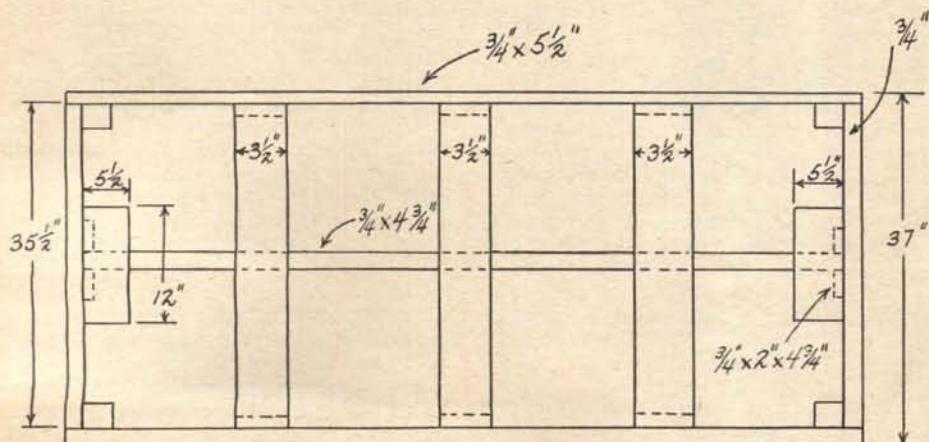
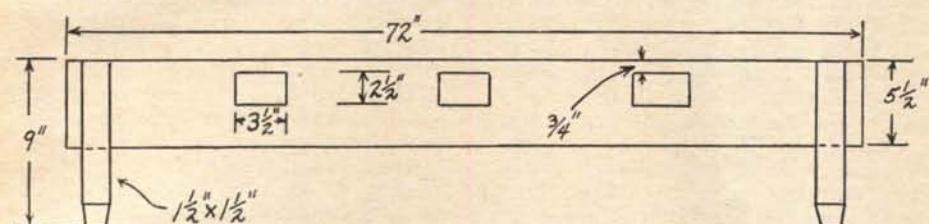
Making TWO Beds from One

WEBSTER P. TAYLOR

THIS easily constructed frame plus an inner spring mattress makes a comfortable bed.



HERE'S THE FRAME with the mattress in place. Result—an inviting, modern styled bed.

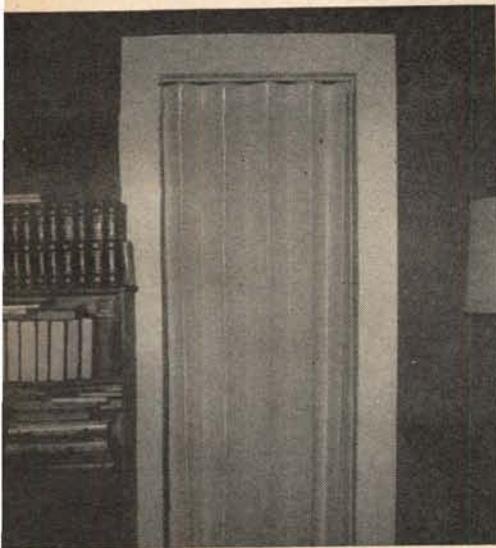


ALL TOO frequently in your modern home a small crisis develops when Uncle Matt and Aunt Millie or sister Sue with her brood descends out of the blue or from Pinckneyville to spend a week end or a week. And the reason is usually lack of enough beds. Somebody usually winds up on the floor and that somebody is usually father.

An easy answer to this problem is possible because of the prevalence in today's homes of Hollywood-style beds, which consist of a well-padded box spring and an inner spring mattress. That well-padded box spring can serve as a comfortable bed itself and with the bed frame shown here, a second equally comfortable bed can be made with the inner spring mattress.

The dimensions shown on the drawing of the bed frame are flexible and can be adapted to a full-size bed, a three-quarter or a single. This one is for a three-quarter having a mattress 39" x 74". A slight overhang is allowed to provide the fullest possible support since the mattress lies on top of the frame instead of within it. Note that the center support is $\frac{3}{4}$ " lower than the outer frame so that the cross supports will rest flush with the top of the outer frame. The frames have the added advantage of being easily stored, for they are only 9" high and when stood on end take up a very minimum of floor space. Further, when finished with one of the many wood stains available they actually become a decorative as well as useful piece of furniture.

Wood sizes shown are actual although if lumber must be bought, 1" x 6" would be the size to specify for the outer frame. Anyone handy with a saw and hammer can put one of these frames together in three or four hours and it becomes time well spent particularly if the man who makes the frame is the one who usually has to sleep on the floor.



PHOTOGRAPH A—Completed doorway with folding door.

Adding an Inside Doorway

J. J. LIGHTER

If you're not a magician, the best way to go through a wall is to put a door in it. Here's how.

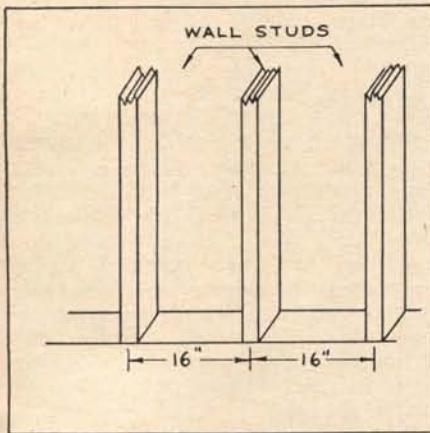


FIGURE 1—Standard spacing of wall studs—16 inches center to center.

THIS ARTICLE is for the information of the average home carpenter who has never constructed an inside doorway—but would like to. There are many who shudder at the very thought of cutting through a wall—although they have a need for the doorway—because the wall seems to involve some vast mystery with which they feel unable to cope. In most cases this is an unfounded fear.

Most of you are familiar with the term lath. Lath forms a foundation for the plaster on the walls and ceiling. There are three main types of lath: metal, gypsum, and wood. Wood lath, which is in the form of strips approximately $\frac{3}{8}$ inch thick by $1\frac{1}{2}$ inches wide, antedates the use of the other methods in plastered houses. Alterations such as building doorways and the like are more commonly done in the older homes—in which the lath is probably wood.

The reason for alterations in older homes is that ownership of the building may have changed and the new owner may desire something different or simply the fact that the building no longer suits its inhabitants. This article will be based on the use of wood lath because it probably is the type with which most home craftsmen undertaking this venture will have to deal. If your home uses a different type of lath you can modify the information to suit your own needs. This article also presupposes the fact that the outcome is to be a doorway for maximum utility—durable but built with a minimum of time and expense. For this reason certain suggestions are made from time to time that may not exactly suit the needs of all readers. This article is not intended to be so limiting, however, that you cannot easily

adapt the information to fit your individual problem.

ONE OF the first considerations in building the inside doorway is its desired location. After the general location is determined certain things must be determined for sure before exact location can be fixed. One of the limiting factors is the spacing of the studs. It is usually a great time and work saver to take advantage of at least one and possibly two of the studs as they stand. By wall studs we mean the vertical framework of the wall which is commonly constructed of 2×4 's spaced 16 inches on center as shown in Figure 1.

When one stud is found the others can be located by measurement because of their standard placement. A stud can usually be located by tapping at various places along the wall. There are various devices on the market for locating studs. One type is magnetic in nature and makes use of the fact that any nailing of the wallboard or lath will have to be into the studs. Ordinarily, then, when it points to a nail under the surface of the wall it also points to a stud. Another type is nonmagnetic and indicates a difference in the vibration it receives back from the user tapping on an area between studs and the area backed up by a stud. Just as tapping on the wall gives you either a hollow or a solid sound, so the energy picked up by this device also varies and it indicates this difference. Approximations of stud location may be verified by drilling small holes to locate the extremities of stud width.

The doorway should be located so as to blend harmoniously with the rest of the room. It should also be located clear of any obstructions

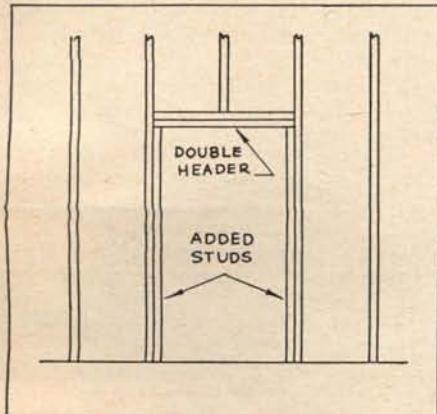


FIGURE 2—Roughed in doorway—the basic framework. One stud only partially removed.

that would limit its use on either side of the wall. It is important to double check each side of the wall before beginning as mistakes are easier to make than they are to correct. If a regular door is to be hung in the doorway then there must be space for it to open fully. It is also wise to use a section that is free of electrical outlets (including the baseboard) and wiring, as relocation of these is time consuming.

CERTAIN allowances have to be made before you can estimate the size of the finished doorway. The width of the doorway need not be the same as the others in the room but the height should be the same. If you are unfortunate enough to have doorways of varying size in the room, then the new doorway should probably be the same height as the one nearest to it as that is the one with which the eye will most naturally compare it.

Figure 2 shows the basic framework for the doorway as it is constructed from 2 x 4's. The finished doorway will be further decreased in width by the addition of the head and side jambs plus the actual amount of space used by wedges in making the doorway plumb. This will be explained as we go along but to give you a base from which to calculate keep these facts in mind as you visualize the changes to be made in the yet untouched studding shown in Figure 1: 1. The width of two 2 x 4's plus the width of the top jamb would have to be added to the desired finish height of the doorway to determine where the center stud should be cut. 2. The finished width of the doorway will be decreased by width of the additional 2 x 4's on the left and on the right, plus the space required to make the jamb plumb on both sides, plus the jambs on the left and on the right. If a regular door is to be hung in this doorway, clearances will have to be allowed for proper operation. NOTE: Dressed 2 x 4's are nearer $1\frac{1}{2}$ x $2\frac{1}{2}$ in size and the dressed lumber ordinarily used for the jambs and casing is $\frac{3}{4}$ inch in thickness.

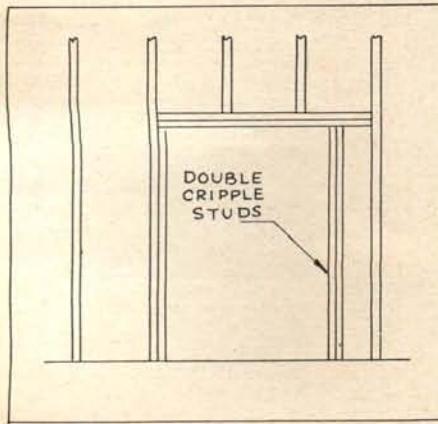


FIGURE 3—Roughed in doorway where more width is required. Two studs were cut off here and rough width is now controlled by the installation of double cripple studs.

The finished doorway as shown in Photograph A is approximately 24 inches wide, which is a considerable reduction in size from the original space available between the studs (with only one stud removed). If two studs were removed, the space would obviously be much larger than ordinarily practical. The answer to this is a compromise which would require the basic construction shown in Figure 3. This is, of course, a more troublesome alteration and should be avoided if the smaller doorway will do. The folding door shown in Photograph A is especially useful when one is constructing his first doorway as it will adapt to a variety of openings and save the trouble of fitting a door.

AFTER LOCATING the studs and taking into account the additional thickness of materials required to "beef-up" and finish off the doorway the laying out of cutting lines is the next step. These cutting lines should be drawn in as close as practical to the finish dimensions for several reasons. Although the casing (external trim added to doorway) is intended to hide minor mistakes more plaster sometimes comes off than is desired. After the doorway is roughed out the naked edges of the 2 x 4's must be built up the thickness of the lath plus the plaster. This is less trouble if there is not such a big area to fill in.

Using a brick chisel, score through the plaster to the lath all along the cutting lines. A brick chisel (see Figure 4) is available in several widths. Since there is plenty of area to be covered—both sides of the wall don't forget—the wider the better. If properly scored, a considerable amount of plaster can readily be torn away from the cutting area. Deep accurate scoring will help insure that plaster will not be accidentally torn from the wrong side of the cutting line. Removing plaster creates considerable mess and dust. It is a good idea to cover the adjacent area including floor and furniture.

Be sure to remove all plaster from the area to be cut before beginning

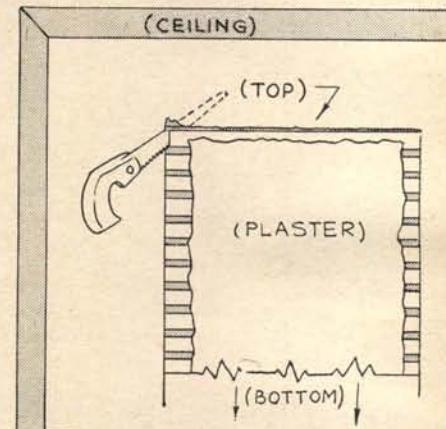


FIGURE 5—After the plaster has been removed from the cutting area a compass saw can be started in the small space available.

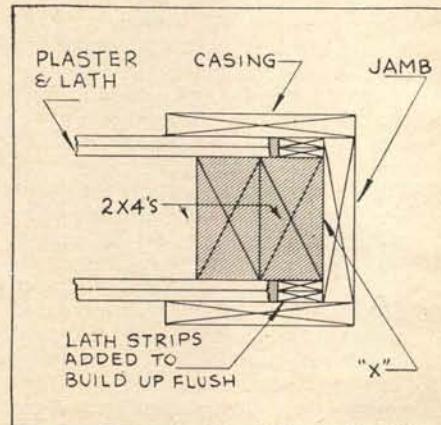


FIGURE 6—This shows the relationship between the members in a finished section of a vertical portion of a doorway, as seen from the top. If wedges were needed to plumb the jamb a space would be needed at "x"—see also Figure 8.

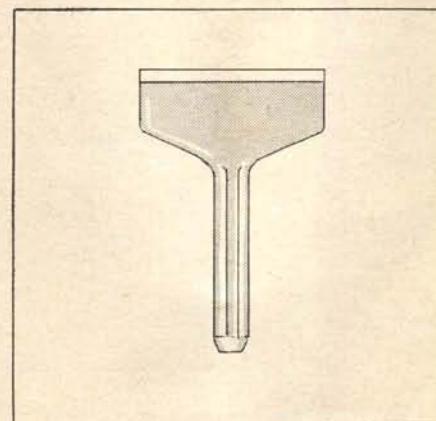


FIGURE 4—Brick chisel.

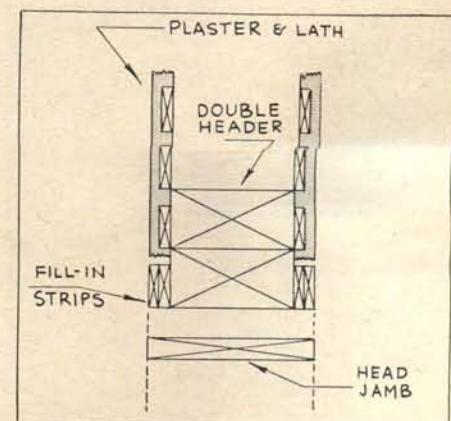


FIGURE 7—This shows the relationship between the members at the top of the doorway opening prior to installing the head jamb.

to saw the lath because plaster will dull a handsaw in a very short time. A compass saw (Figure 5), is excellent for cutting the first several pieces of lath away. After there is sufficient space to operate it a hand-saw will, of course, do a quicker job. When all of the work is completed on one side repeat the process on the other side of the wall. The baseboard will also have to be cut and removed. Do not remove any more baseboard than necessary until you have determined how wide the casing will be or just how you are going to finish off the casing at the bottom.

AFTER THE opening is cut the next step is to rough in the opening as shown in Figure 2. The cripple studs are cut to the height of the finished doorway plus $\frac{3}{4}$ inch (to allow for the head jamb) and nailed in place. If headers are now cut to length they may be held across the cripple studs and the center stud accurately marked for cutting.

Cut the center stud and nail the headers in place. As shown in Figures 6 and 7, jamb width is controlled by the thickness of the wall. The casing must be parallel to the wall and also to the edge of the jamb. Thickness of the wall can be accurately determined by holding flat pieces of wood on opposite sides of the wall and measuring the distance between them. This is the same as the space between the casings that the jamb must fill as shown in Figure 6. Next cut the head jamb to length and place in position. It must be centered as in Figures 6 and 7. A check with a level at this point may indicate that some adjustment is necessary in order to level up the head jamb. Common beveled wood shingles are very handy for this work and may be placed in the manner shown in Figure 8. When centered and level, finish nailing in place.

Cut side jambs and place in position, being careful to center them according to wall width—as mentioned above. A plumb line and a level will indicate if the side jambs

are plumb (perfectly upright and at 90-degree angles to the head jamb). If they aren't, which is probable, wedge shingles between the studs and the jamb (as shown in Figure 8) until the condition is corrected and at as many points as needed. Finish nailing in place. Of course, all nails used on the casing and jambs must be countersunk so that the holes can later be filled in and sanded flush.

Figure 9 illustrates the building up of the rough frame to the thickness of the wall. These are the fill-in strips shown in Figures 6, 7 and 8. Two thicknesses of lath nailed to the studding on each side will be approximately the same as the thickness of the lath plus the plaster. Casing width, incidentally, should be sufficient to cover all of the intended areas so that little or no plaster patching will have to be done. The casing width should also have some relation to the size of the doorway and the other casing used in the room. As may be seen from the photographs, the casing does not quite cover the area at the top of the doorway where too much plaster was removed. This width of casing, however, seemed to suit the job best and a small amount of patching plaster takes care of the cavity. A little more care in earlier processes would have eliminated the need for even this.

THE LAST big carpentry step in the completion of the doorway itself is the addition of the casing. You may wish to try to match the casing that is already in the house. In some cases this may be difficult or at least rather expensive if it is ornate and no longer standard millwork. The casing shown in the photographs is plain with mitered corners at the top. Mitered corners leave no raw edges but the 45-degree angles must be very carefully cut or a poor fit will result.

The edges of the casing are shown in these drawings as being flush with the surface of the jamb. It appeared to be easier to construct it in this manner. This has not, however, been

standard practice. You may wish to set the casing back $\frac{1}{4}$ inch or so instead of making it flush.

Figure 10 shows one method of trimming the bottom of the doorway—by the use of a plinth block. Satisfactory results can be obtained, however, by simply running the casing to the floor and cutting the baseboard to fit as nearly as possible.

After applying the proper finish you have completed a doorway. If you wish to hang a door then you have more work—but at least the smaller portion of the work—ahead. A folding door (shown partially open in Photograph B) is recommended for several reasons. 1. Plastic doors, such as the one shown, are available with all hardware for as little as \$6. 2. Installation consists mainly of installing a track on the head jamb. 3. The bottom may be cut off at any desired length. 4. It may be opened from either direction. 5. It fits a wide range of doorway widths—without sawing or planing.

Except for magic, the best way to get through a wall is to build a doorway—and you can do it.

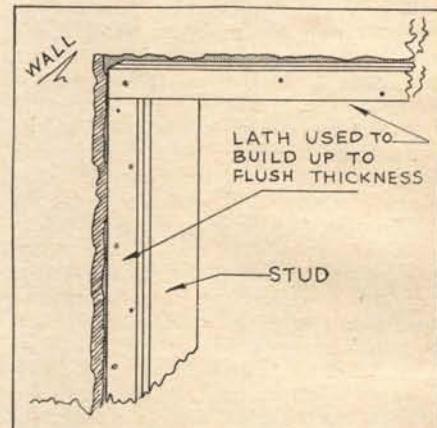


FIGURE 9—Double thicknesses of lath nailed to the 2 x 4's will give a flush surface.

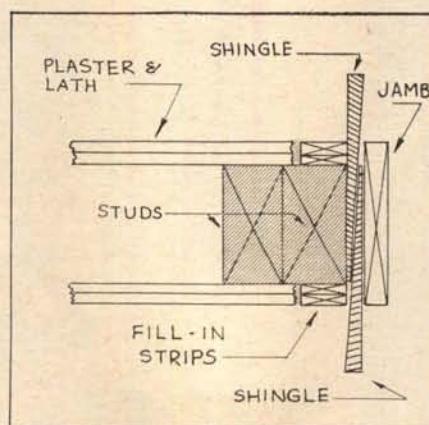


FIGURE 8—The jamb can be corrected vertically and horizontally by wedging in shingles as shown. The shingle ends, of course, are broken off before adding the casing.

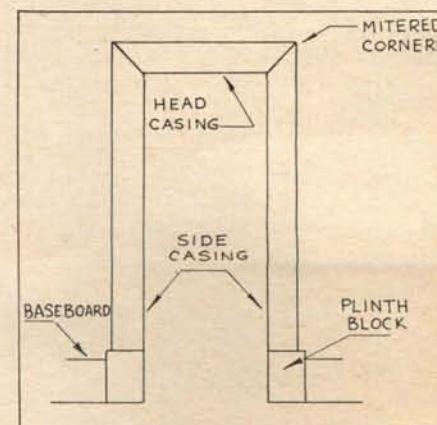


FIGURE 10—Plinth blocks are used here to trim the bottom of the doorway.



PHOTOGRAPH B—The completed doorway with the folding door partially open.

Tips on Driving Screws

DALE MOREY

IT'S PROBABLY because it looks so easy that many people make a poor job of driving in screws. The result is a poor fixing and split wood.

Always make a clearance hole for the screw shank in the outside piece of the wood (Figure 1), and then make another hole of more than half the diameter to take the threaded portion. When fitting a metal strip (such as a hinge) to wood, drill a short clearance hole in the wood after making a full-length hole for the thread (Figure 2). If you don't do this, the wood, especially if it is hard, is almost sure to split so that the screw gets a poorer grip.

For countersunk screws, make a small sinking for the head with either a countersink bit or the tip of a larger drill. But if you don't have a suitable tool, the sinking can be made with the corner of a really sharp chisel, or even with a pocket-knife. Cut across the grain first, on each side of the hole.

Where screws have worked loose, as they often do on door hinges, you can't always replace them with bigger ones. In any case, a better method is to drill clearance holes in the wood and then press in ordinary wall plugs. The screws will then hold firmly and permanently. A fairly satisfactory alternative is to plug the bottom half of the hole with steel wool and to drive the screw into that.

If you have to remove screws whose heads have been painted over, first scrape the paint out of the slot with the point of a file. Then, with the screwdriver square in the slot, tap the end with the side of a hammer; that should free the screw. If it is rusted into the wood, hold a hot poker against the head for a minute or so to free it.

It is a good idea to smear with shoe polish screws that have to be removed occasionally. An even better way is to dip them into shellac or other thin varnish; but see that the varnish is very dry and hard before the screws are used.

Never drive ordinary steel screws into oak, because the acid in this wood will corrode them so that they cannot be removed without breaking. Brass screws will not be affected by the acid, and steel ones can be given some protection by coating them with varnish, as mentioned before.

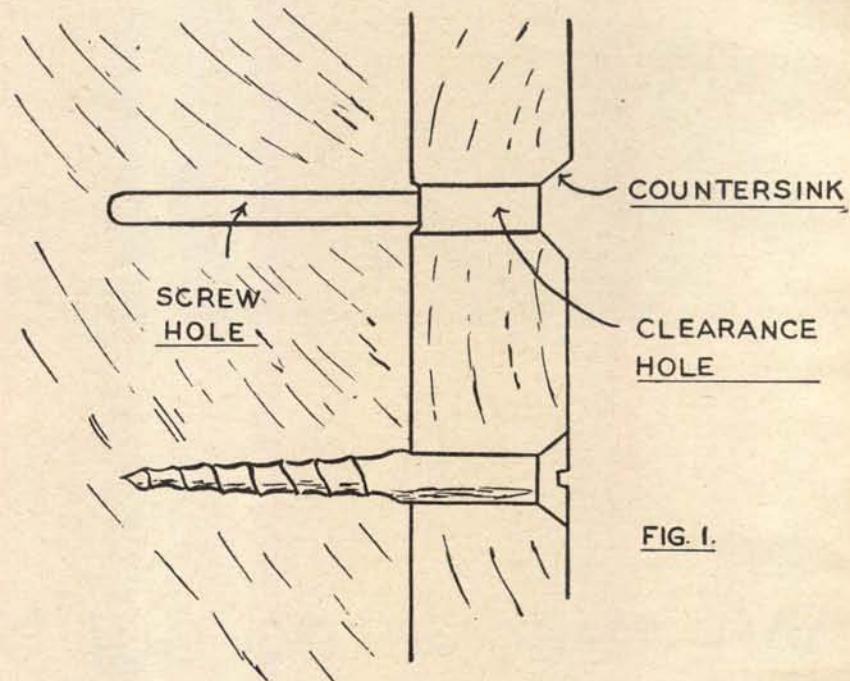


FIG. 1.

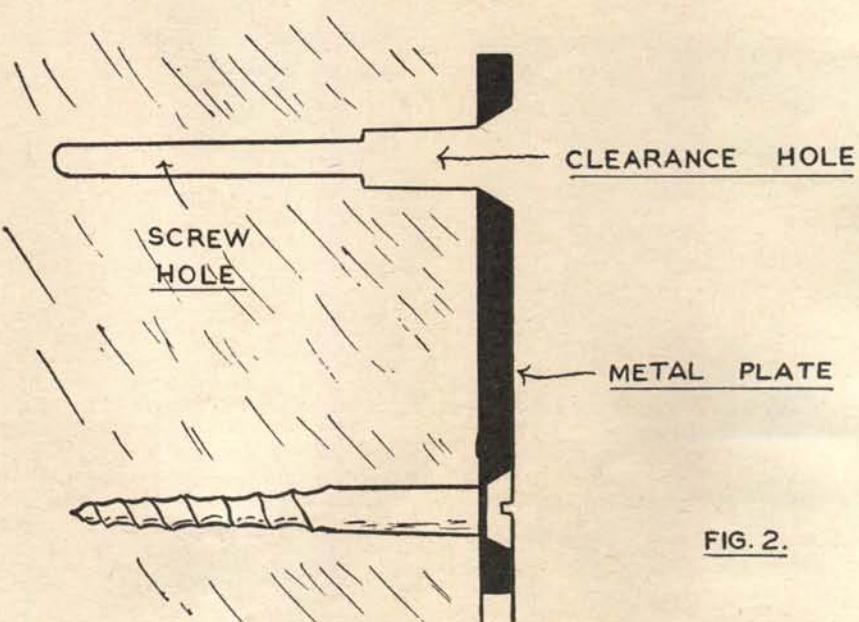
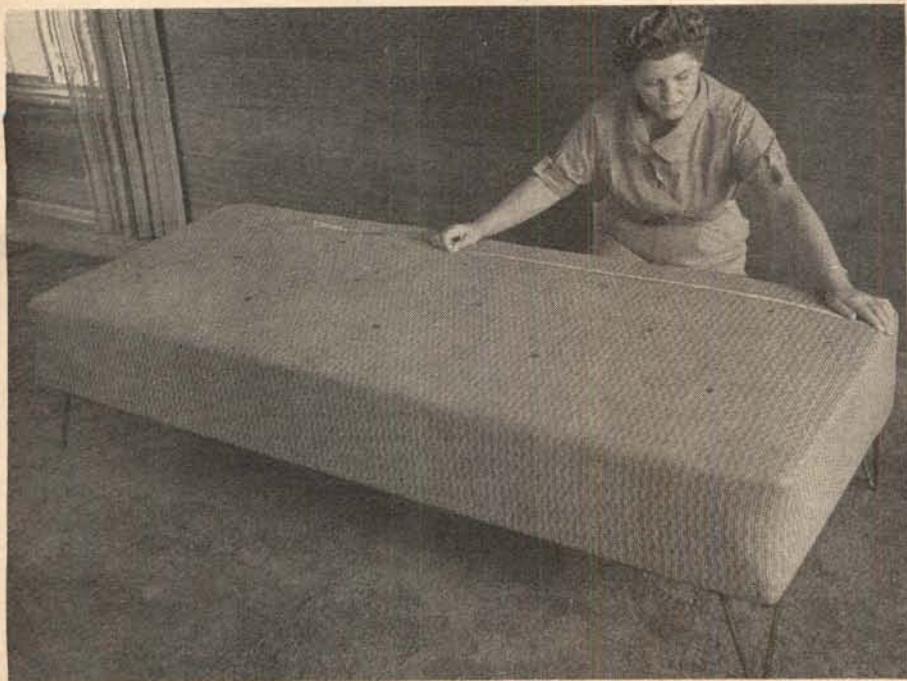


FIG. 2.



PHOTOGRAPH 1—Measure all the dimensions of the sofa to be covered to determine the yardage of material required. Be sure to allow extra material for seams.

PHOTOGRAPH 2—If your sofa is studded with buttons, these must be removed before the new cover is installed. Check underneath the sofa first to be sure that these buttons do not hold springs or stuffing in place. If they do, steps must be taken to stitch these items in place before removing the buttons.



We recovered our Sofa Ourselves

EDWIN HOFFMAN

Their eyes told them, yes, their sofa did need recovering, but their budget told them, no. Here's how the Edwin Hoffmans broke the deadlock.

A SHABBY or stained piece of living room furniture distracts greatly from the beauty of your home. The easiest way to remedy this is to buy a new piece of furniture. At our house recently finances did not allow for this easy method. Therefore, with the basic frame of the piece of furniture found in good shape, we decided to recover the offending piece.

A check of ready-made as well as custom-made sofa covers showed that our budget would not stand for any such extravagance as purchasing these ready-made products so another do-it-yourself project was born.

First the piece to be recovered must be carefully measured—on all sides (Photograph 1). Visit your local yardage store and decide upon the type and color of material that goes well with your other furniture and your walls and rugs. After the desired type and color of material is selected you are able to determine the amount of material needed. Fig-

ures will not be given here because sofas vary in size and shape as do the widths of materials. Materials are obtainable in widths from 24 to 54 inches. The measurements of your particular sofa must be applied to the width of the material you have selected to determine how much yardage is needed. If there is any question, the sales clerk in your yardage store will be glad to assist you in determining the proper length needed, allowing for all cuts and seams.

In our case the surface of the sofa was studded with several dozen buttons that were affixed to it through the entire thickness of the top of the sofa. These buttons had to be removed (Photograph 2) so that they would not show shiny spots, or wear through the new cover that was going to be put on. Before removing the buttons see that they are not used to hold stuffing or springs in place. In our case they were not.



PHOTOGRAPH 3—The simplest way of cutting the material to size is to lay it out on the sofa that is to be covered. Be sure to reverse the material first so that the seams are on the proper side after sewing. Your ability as a seamstress will determine if this method is to be used or if you can make the cover from the measurements made earlier.

If they are, the stuffing or springs must be secured by stitching with an upholsterer's needle before the buttons are removed.

This is done very easily. An upholsterer's needle may be purchased, along with a ball of heavy thread, for about a dollar. They are obtainable at most do-it-yourself or hobby shops as well as at upholstery shops. Turn the sofa on its side to make the operation easier. Thread the needle and push it through the top of the sofa from the underside, alongside where a button is located. Return the needle and thread through the top of the sofa, from the top, at a point about a quarter of an inch from where it came through from the bottom. Cut the thread and tie the two ends in a square knot enclosing the spring or stuffing that the button's thread now encloses. Cut the thread holding the button and remove it. Repeat this operation alongside each button before removing it. Be careful that your new thread is securing the spring or stuffing that the original thread secured.

If the buttons and threads do not secure a spring or stuffing, your task is much easier. Turn the sofa on its side, cut the threads holding the buttons and remove buttons and threads.

IF THE covering of your sofa is still quite strong but shabby or faded, it will give you a more professional job if it is left on. Otherwise, if its surface is rough and may appear lumpy through the new covering, it must be removed.

Before removing a covering and before a new covering may be put on if you are leaving the old covering on, the undercovering of the sofa must be removed. This undercovering is usually made of cheesecloth or a similar porous material and is put on the underside of the furniture

for a neater appearance as well as to trap any small pieces of stuffing that may work loose. It must be removed after the legs so we shall go into that at that time.

If you are an excellent seamstress you will be able to cut and sew the entire cover from measurements you made earlier. As many do not qualify as experts, the easiest way of insuring a good fit is to lay the material out on the sofa and cut and pin in place (Photograph 3). Remember to reverse the material before pinning so that the extra seam material will be on the inside. Be sure to pull the material taut before pinning so that the cover is snug and not loose and bulgy. Again your ability as a seamstress will determine if you want to add cord binding to the seams. We did not feel that the binding would add anything to the finished product so eliminated it. If you want to use the cord binding, it is inserted between the material of the top and sides and sewn when the material is sewn together.

After pinning and cutting, the seams are sewn on your sewing machine (Photograph 4). Be sure to use a strong thread for the work as the cover will be subjected to considerable strain when someone is sitting on the sofa. There is little to say about the actual sewing except to urge you to keep the seams as straight as possible for a better fit.

Next, the cover is tried on the sofa and smoothed down (Photograph 5). At this time you will see if it is too big or too small and make any necessary alterations. Do not attempt to stretch the cover into place if it is too small as this will put an unnatural strain on the seams as well as the material and limit the life of the cover. If it is too loose, remove your stitches and resew. A loose cover will just give a sloppy appearance.

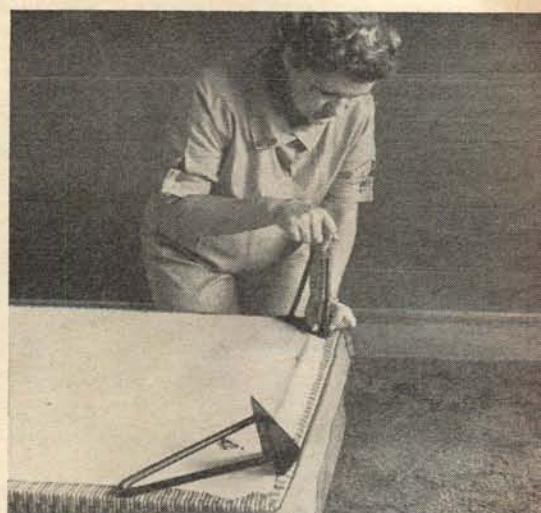
LEGS ARE attached to a sofa in three ways—nails, screws and bolts. Our legs were of wrought iron and attached with three screws in each leg base. These legs must be removed (Photograph 6) before you proceed with the next step. Measure and note the placement of the legs in relation to the corners of the sofa. The screw holes will be covered with the new material so this step will assist you in relocating the legs as they were before. If the legs are attached with bolts, the system is similar. On some less expensive sofas nails affix the legs. These can be removed by grasping the nail heads with a pair of pliers to start them, then completely pull them with a nail-puller or hammer. In some cases the nail-puller may be used from the start. In stubborn cases the nails can be driven completely through the



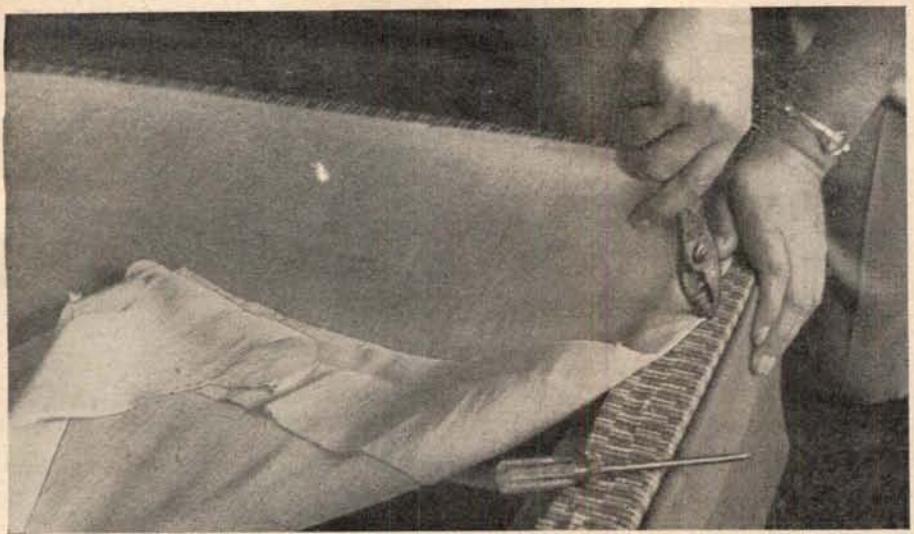
PHOTOGRAPH 5—Pull the material tight to see that all seams are in place and the fit is proper before tacking cover to the sofa. If there are any errors, now is the time to correct them.



PHOTOGRAPH 4—Sewing should be done by machine to give straightest edges and most professional looking project. If you do not own a sewing machine, they may be rented for a nominal fee.



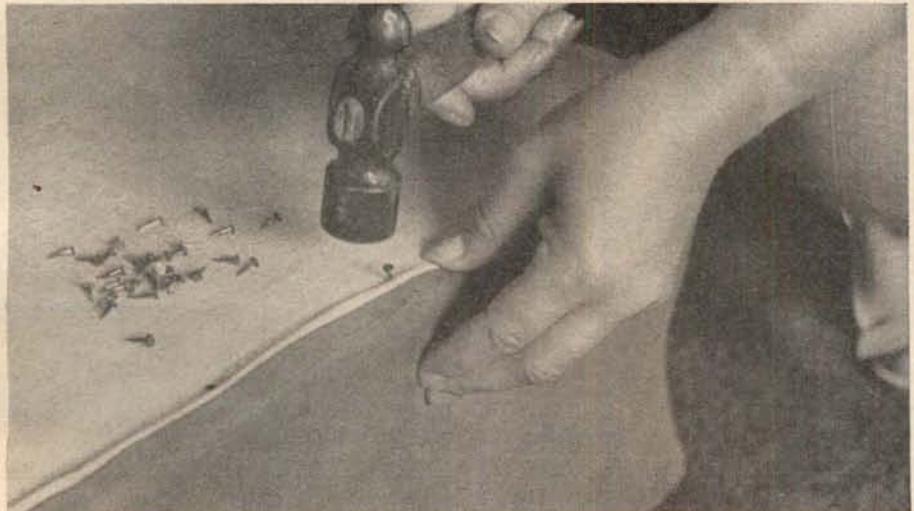
PHOTOGRAPH 6—Remove the legs from the sofa. Legs are attached by three methods—with screws, bolts and nails. No matter what method is used, be sure to note the exact position of the legs before removal so that they may be returned to the same spot for greater strength and better appearance.



PHOTOGRAPH 7—Remove the stapled covering, under the sofa, with a pair of pliers. These covers catch any stuffing that may work loose and also give a more finished appearance.



PHOTOGRAPH 8—Staple the covering in place after first stretching it tight. This step is followed by tacking in place with 6/16-inch long carpet tacks. Upholstery tacks are not necessary for this task, in fact would be too bulky to go under the covering.



PHOTOGRAPH 9—After covering is tacked in place, the undercovering is stapled and tacked. Stapler is used initially to hold material in place and then tacks are used for permanent installation.

wood with a nail set, then removed from the sofa after the legs are removed.

As you have measured and noted the location of the legs to the sofa corners, they can be repositioned in the correct spots for greater beauty and strength. If the legs were affixed with screws, check to see that all are straight. Replace bent ones. If screw holes are too loose, partially plug them with a wooden match stick or other soft piece of wood. Before inserting the plug, dip it in wood glue, so that it will be held in place.

The undercovering of the sofa, mentioned earlier, must now be removed (Photograph 7). It will be affixed with staples or small tacks. Remove the staples or tacks and the undercovering is off.

The covering that you have just completed is now stretched into place and secured with staples (Photograph 8). It is best that the sofa be turned completely upside down for this step. The covering can be tacked into place immediately but unless you have several extra hands for this step, stapling makes the job easier. A heavy duty stapler is needed for the job and these may be bought or rented. Another advantage of stapling is that staples are easier to remove if you did not get the cover on right. After stapling all around, invert the sofa and check to see if the material is centered and stretched properly. If not, make necessary corrections before tacking permanently in place.

Six-sixteenth inch carpet tacks are used for the final tacking. They are hammered into place with a tack hammer or other small hammer that may be available.

The undercovering is stretched into place and affixed with staples. It may then be permanently affixed with the same size tacks (Photograph 9).

IF YOU were careful in noting the position of the legs before removing them, you will be able to put them back on with little effort (Photograph 10). Otherwise you will have to probe with an ice pick, or other sharp object, to locate the holes, if they were held on with screws. Bolts are a simpler matter as the holes are much larger and may be felt through the material. When reaffixing the legs that were held with nails, you need your earlier measurements to get them in the right position. It is not necessary to put the new nails in the old holes. Also do not attempt to reuse a bent, and straightened, nail. Bent nails never drive true, no matter how well they are straightened.

If you plugged any screw holes to give a tighter fit, the screws that are to go into these holes should be lubricated with wax or paraffin before inserting. This will allow easier entry into the tight hole without splitting the wood. This wax or paraffin on the threads of the screw will not affect its holding power.

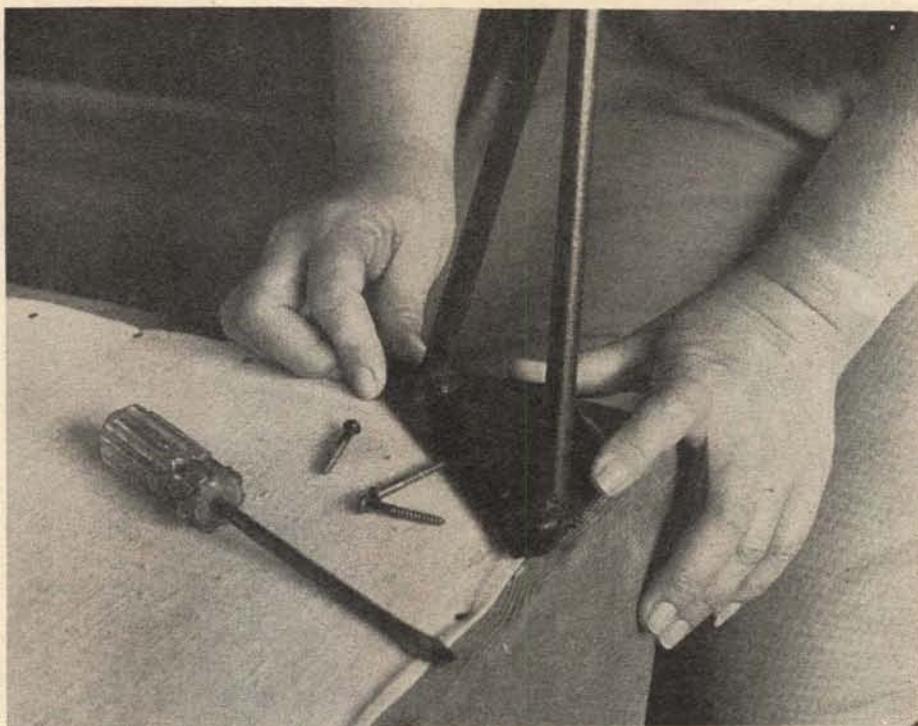
If you desire, the buttons you removed earlier may be put back on. This is done by running your upholsterer's needle up from the underside of the sofa, hooking it through the button and returning through the same hole. The loose ends are tied on the underside. This must be done before the undercovering is replaced. We did not do it as we felt the uninterrupted smoothness of the surface was more attractive than one cluttered with buttons.

Now your sofa has been completely recovered (Photograph 11) at a fraction of the cost of ready-made covers. This custom-made cover, which you have just completed, will be as near a perfect fit as your ability will allow, whereas ready-made covers do not always fit well because of the multitude of sizes in which sofas come. Cost of the project is controlled mainly by the type of material selected. We decided to use a corduroy material and by waiting until one of the local stores had a sale of the type of material and color we wanted, we held our cost to the absolute minimum. Other materials required are thread, tacks and staples—worth not more than a few cents each. A word of warning—use the best material and thread that you are able to afford for this project. A cover of this type is put under severe strain every time someone sits on the sofa and a few cents or even a few dollars more in material costs will mean months or years more wear and longer life with a better appearance.

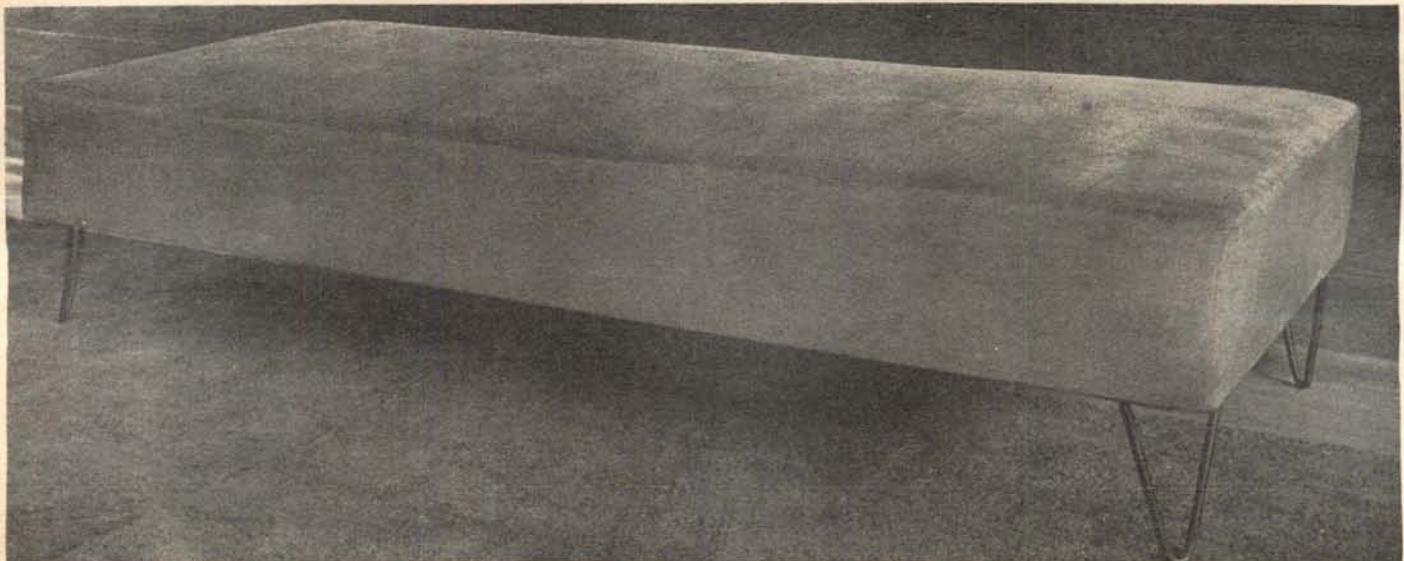
Tools required are simple: a hammer, screw driver, pliers, a stapler, a pair of scissors and, of course, a

sewing machine. If you do not own a sewing machine one may be rented for a nominal sum or even better, some of the sewing machine centers will allow you to do the complete sewing job on their premises for a nominal fee and at the same time provide advice if needed.

Time involved again depends upon the individual. In our case we recovered two sofas in a period of four hours. The nature of the task is such that each step can be done as a phase and work continued at a later time with no effect on the completed project.



PHOTOGRAPH 10—Locate the legs in their proper place and reinsert screws. If any holes were too loose they should be plugged with match sticks or other soft wood before inserting screws. These screws hold the entire weight of the sofa and those sitting on it so they must be secure. Lubricate the screws with wax or paraffin for easier insertion.



PHOTOGRAPH 11—The finished sofa. Neat and clean and good for several more years' use.

Always wanted a greenhouse? This one isn't very big but it's simply made and serves a useful purpose.

Give Flowers an early start with this Small Greenhouse

R. S. HOWARD

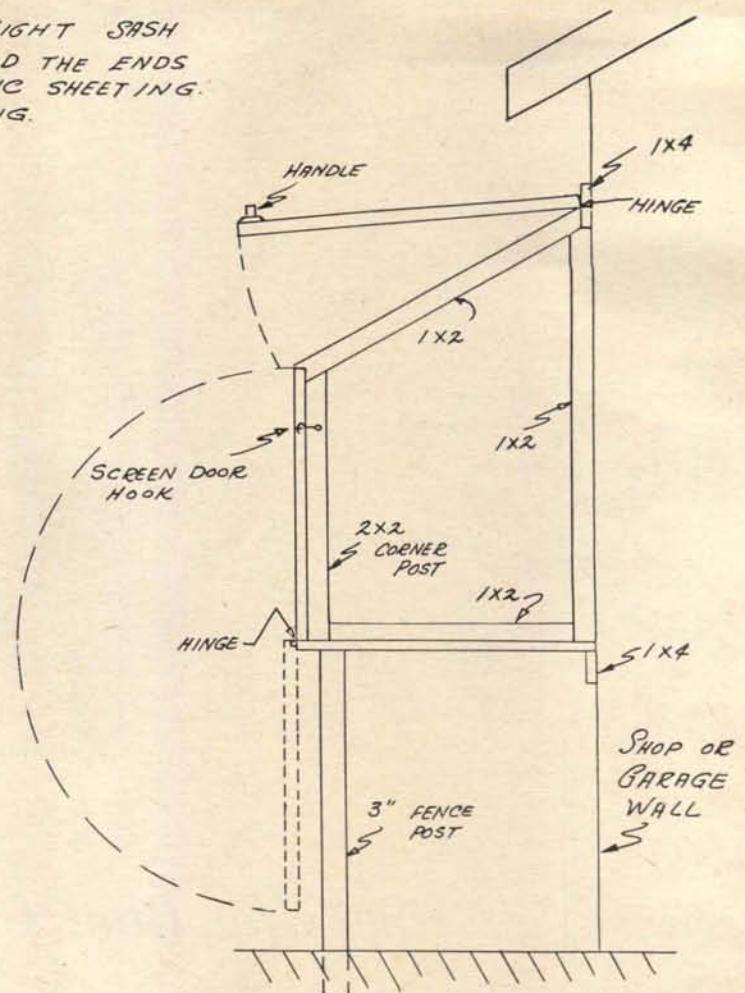
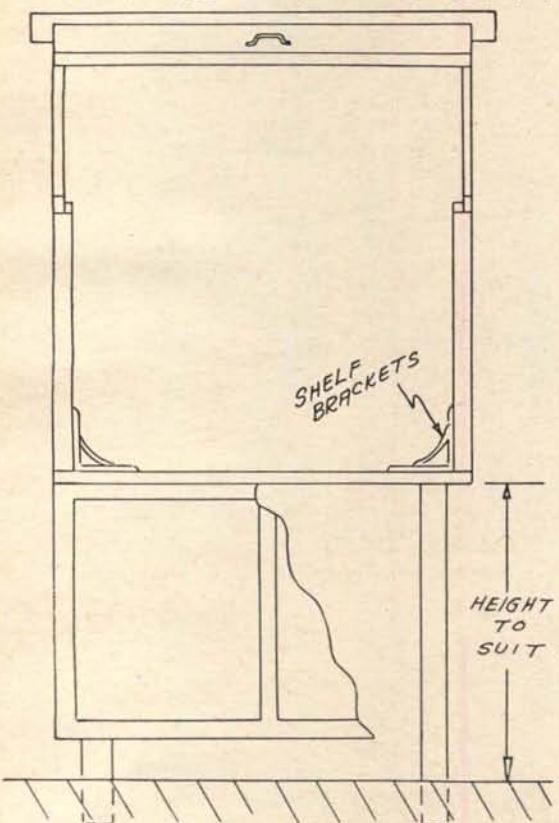


THIS SMALL GREENHOUSE, built from two window sash, is shown with the front sash open. When closed, it provides early spring protection for seedlings and transplants, but allows plenty of sunlight to enter the enclosure.

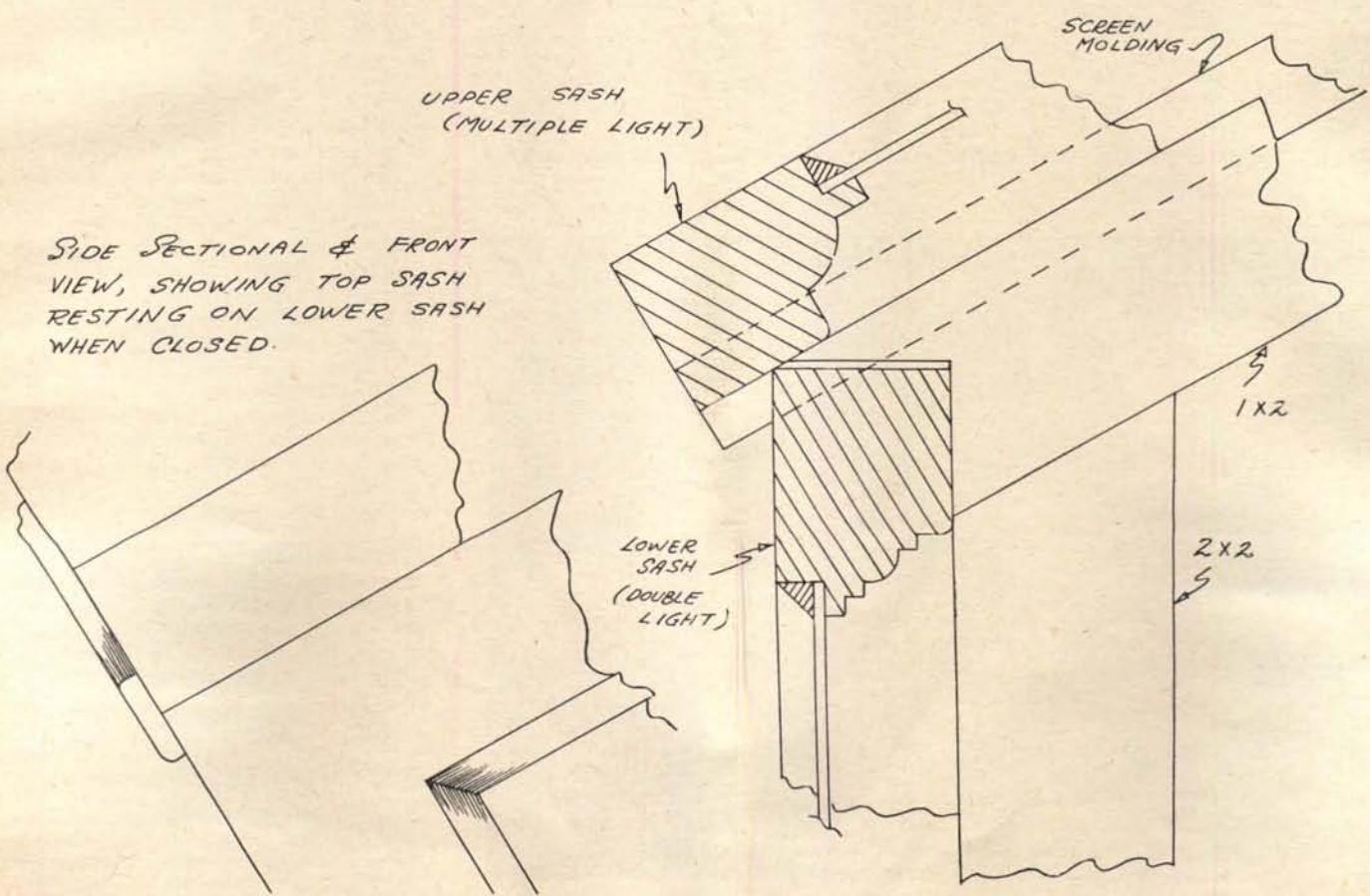
ALTHOUGH DEFINITELY not for winter use, this enclosure affords protection from the early spring chill and gives transplants and seedlings plenty of sunlight. It is built of two window sash, one for the roof section and one for the front, with clear plastic film or sheeting such as is used for storm windows applied to the ends. The unit is built on the side of a shop or garage, preferably facing south so as to get the full benefit of the early spring sunshine. Multiple light sash is most desirable for the roof, as the small panes of glass give strength, while the larger panes are used for the front so as not to obstruct the view of the plants when it is closed.

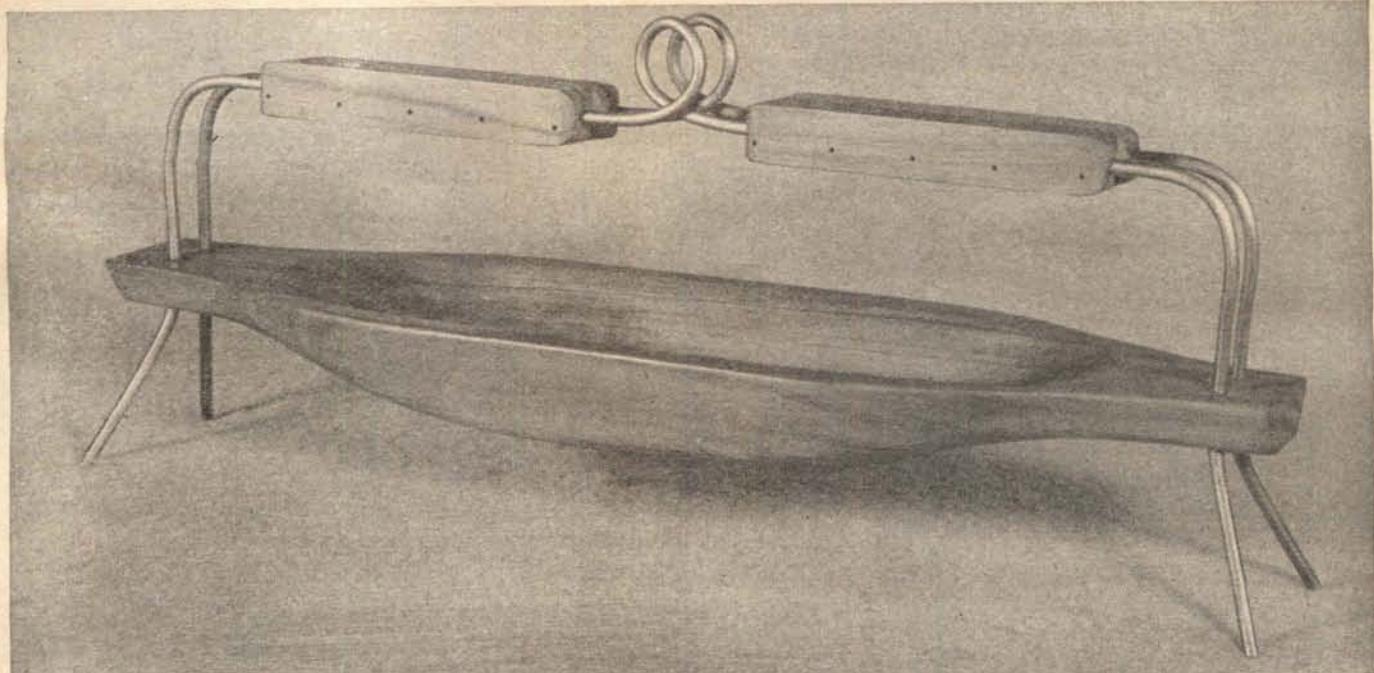
The floor or "bench" of the unit is built first, the size being determined by the sash used, and the right height from the ground is determined. In this case the greenhouse was built just outside a shop window, giving access to the plants from within. The bench can be made of $\frac{3}{4}$ " boards, nailed together with cleats on the bottom. It is well to give the bench several coats of paint so as to prevent the moisture from soaking in when watering the plants. And if one wants to insure a more stable humidity for the growing plants, a 2" layer of sand can be spread out on the shelf, and kept damp. On real frosty nights one or two 100-watt light bulbs will prevent a freeze, and add to the effectiveness of the pretty flowers at night.

TOP OR ROOF IS A MULTIPLE LIGHT SASH
FRONT IS A 2 LIGHT SASH, AND THE ENDS
ARE COVERED WITH CLEAR PLASTIC SHEETING.
TACKED ON WITH SCREEN MOLDING.



SIDE SECTIONAL & FRONT
VIEW, SHOWING TOP SASH
RESTING ON LOWER SASH
WHEN CLOSED.



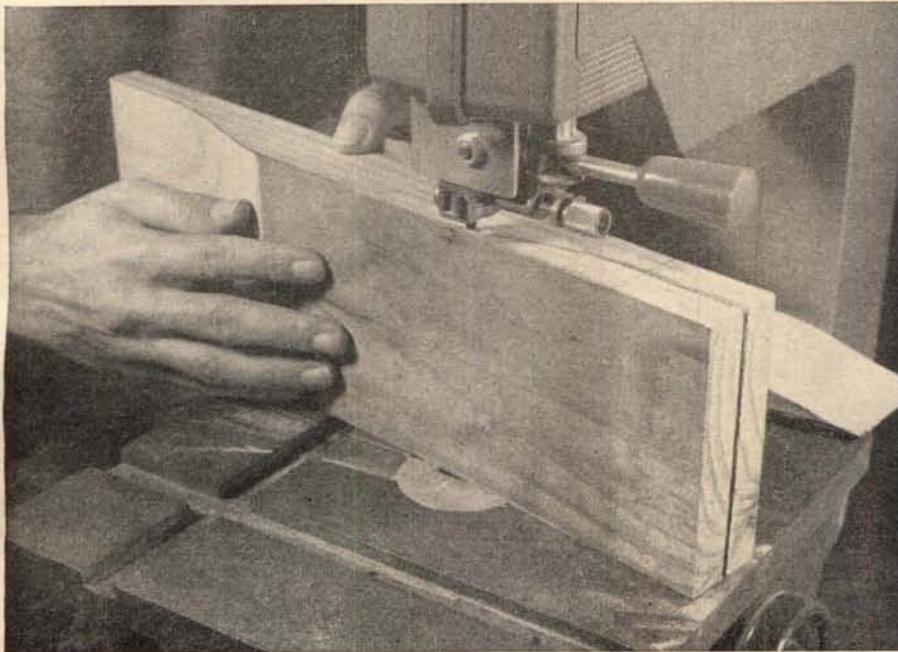


PHOTOGRAPH 1—Handsome mahogany (Honduran) and bright copper tubing are a compatible combination for this hors d'oeuvres server. Boat has sleek lines which are accented by slim copper tubes.

Serving Boat for Appetizers

R. J. DE CRISTOFORO

This handsome wood and copper server will help get any party off to a pleasant start.

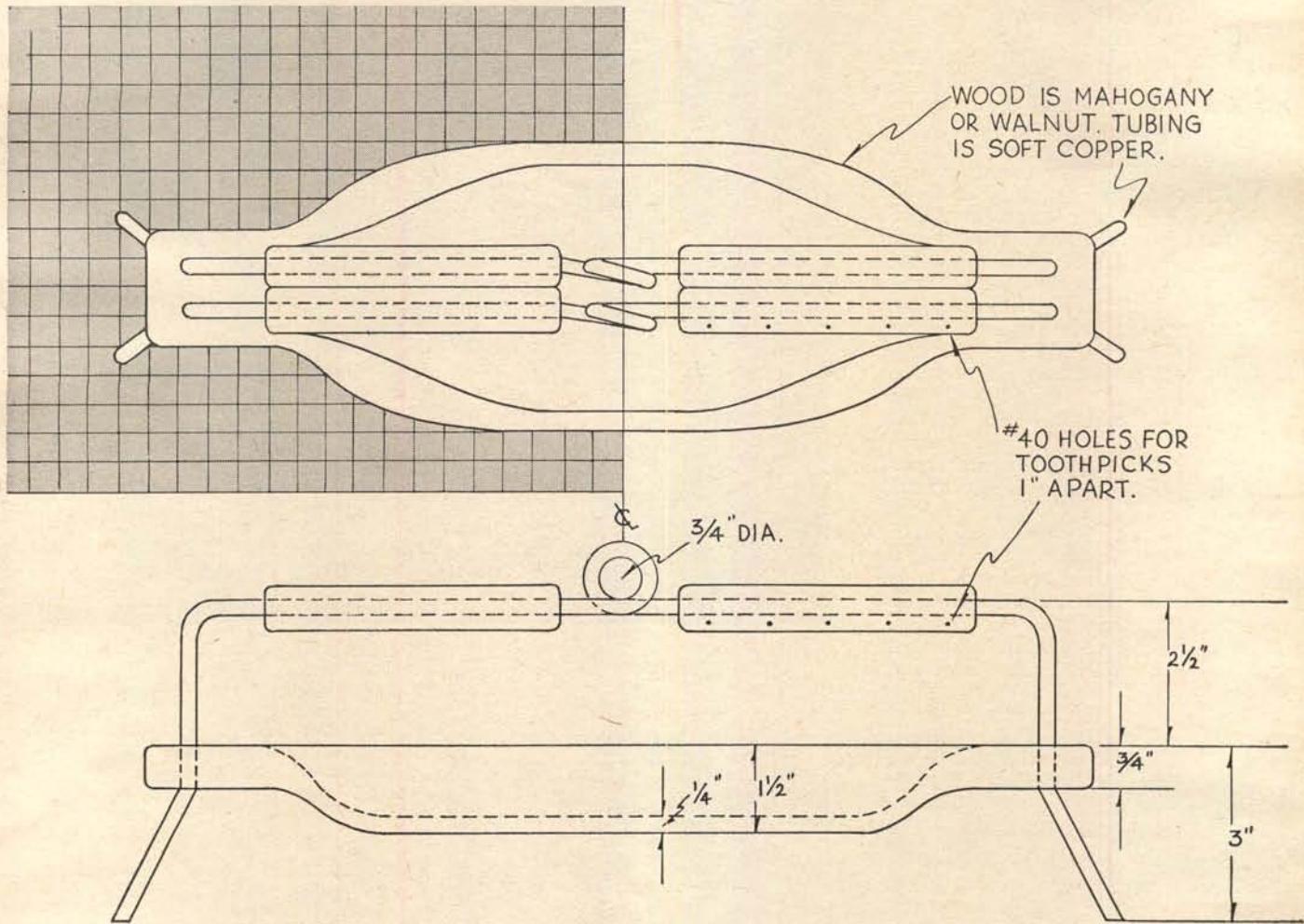


THIS ATTRACTIVE hors d'oeuvres "boat" (Photograph 1) will help the hostess for whom you make it to sail gaily through many a party. And its an ideal gift item if there's a favorite lady or family you wish to remember. It can start out the dinner party heaped with potato chips and with other tidbits "stabbed" on toothpicks. When it has served its purpose here with before-dinner-cocktails, fill it with celery stalks and carrot sticks and bring it to the table, or set it beforehand with flowers as a centerpiece.

Construction is fairly simple. The boat itself merely requires some simple carving as shown in the photographs. Select a piece of wood with attractive grain pattern (mahogany or walnut are suitable). It should be about 1½" thick, by 5" wide, by 16" long. Draw the outline on paper by

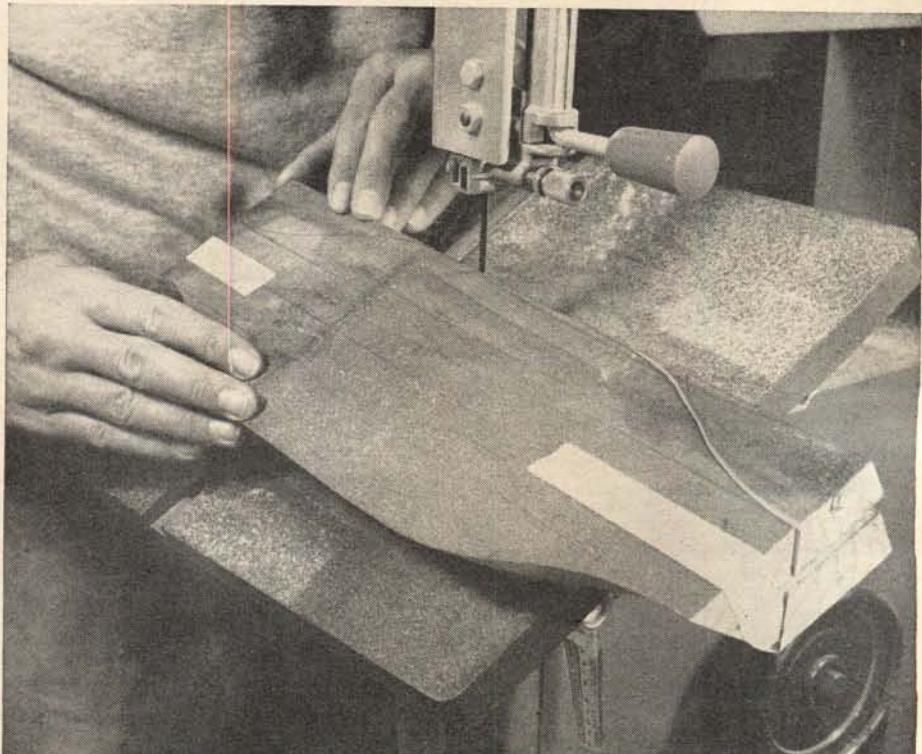
PHOTOGRAPH 2—After the outlines have been drawn on the rough stock, remove the waste by cutting on the band saw. A coping saw will do this, or even a rasp file.

EACH SQUARE EQUALS $\frac{1}{2}$ INCH



using the squared-off top view in the drawing, or, if you prefer, draw it directly on the wood. Remove the bulk of the material by cutting on the band saw or by hand with a coping saw (Photographs 2 and 3). Carving (Photograph 4) and final finishing are done by hand or with the help of a small drum sander as shown in Photograph 5. Be sure, after the roughing out is done, that you smooth the wood down by working through progressively finer grits of sandpaper. When done, the wood should be satin smooth and completely free of scratches.

Next, make the handles, which are also the holders for the toothpicks and drill a $\frac{1}{4}$ " hole down the center, lengthwise; then drill the holes for the toothpicks. Now cut two pieces of $\frac{1}{4}$ " copper tubing, 30" long. Bend each of them in the middle around



PHOTOGRAPH 3—If you are working on a band saw, tape on the waste stock cut from the bottom and then cut the top outline with the band saw table tilted about twenty degrees.

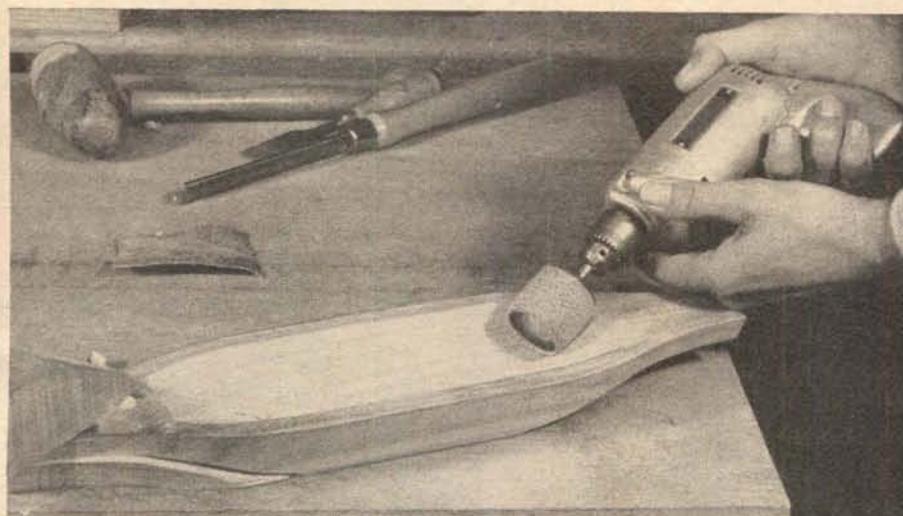
a piece of $\frac{3}{4}$ " dowel or bar stock. Then thread on the handles (Photograph 6). If the handles do not fit tightly, just "kink" the tubing slightly in that area so the handles must be forced on. Then, about 1" away from the handle ends, bend each end of each tube over the same dowel, but only 90 degrees. At this point, check the tube assembly on the boat to get the exact location of the holes the tubes will pass through. Drill these $\frac{1}{4}$ " and pass the tubes through them. Then splay the legs out and trim off any excess. The tube ends can be covered with little plastic or rubber caps. These can be made from regular pencil erasers.

If the tubes do not fit tightly in the holes drilled for them, just drill a No. 50 hole through the side of the boat into the tubes and insert small headless brads. These should be set below the surface of the wood and puttied over.

That's about it! Finish wood parts by sanding ultrasmooth, applying a good penetrating sealer and then sanding again. Finish with two or three coats of paste wax rubbed to a polish. Finish metal parts by rubbing with steel wool and coating with clear lacquer.

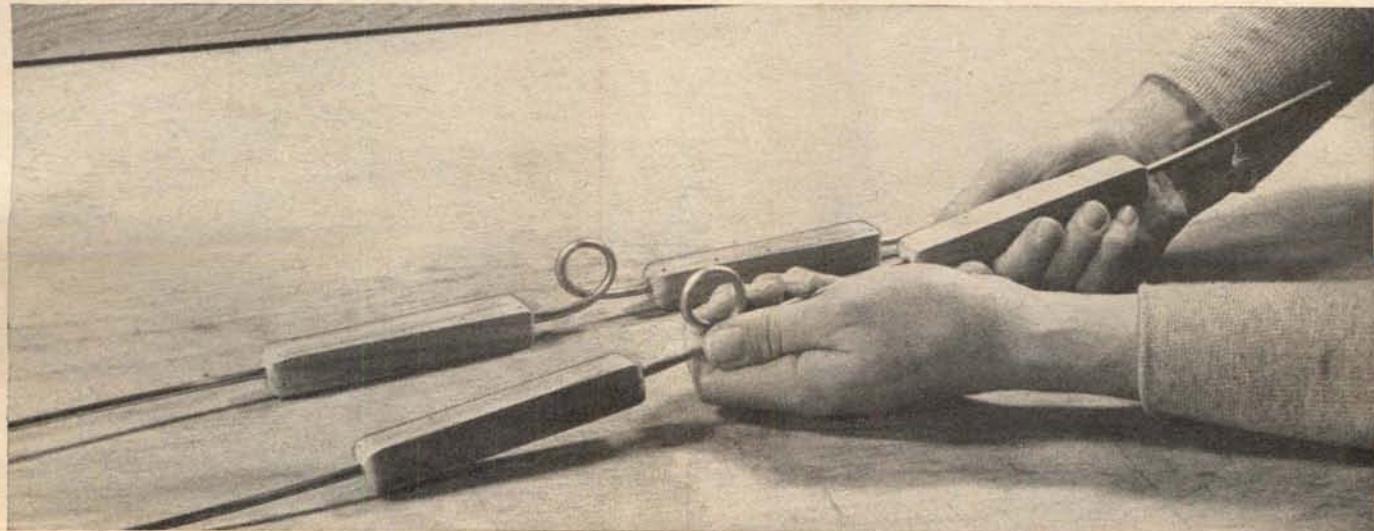


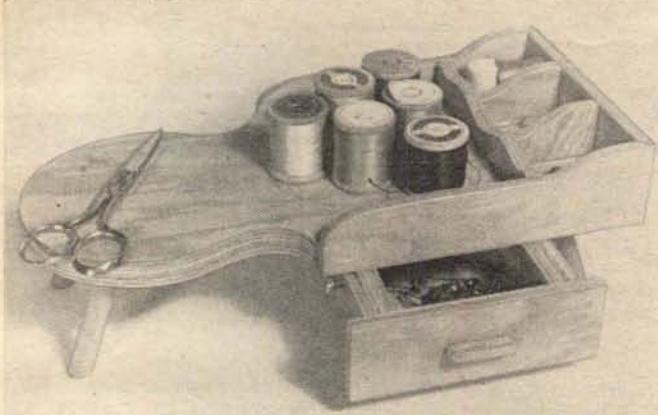
PHOTOGRAPH 4—Next, clamp the block to a firm surface and begin the carving, using a mallet and chisel. Do not attempt to hammer the chisel in too deeply; shave out reasonable amounts of waste. If you have a carving gouge, this can be used when you approach the bottom.



PHOTOGRAPH 5—Final finishing of the inside can be hastened by using a small drum sander on a portable electric drill. This will not only smooth the rough carving but will also make it easier to round off corners. Most of the exterior forming is accomplished by hand, with files and sandpaper.

PHOTOGRAPH 6—After the tubes have been bent in a full circle in the middle, press on the wood handles. Note that toothpick holes have been drilled. Handles should fit snugly, even if you have to bend tubes slightly in that area so they will jam in the holes drilled for the tubes.





Tiny Cobbler's Bench Sewing Kit

WILL STOLL

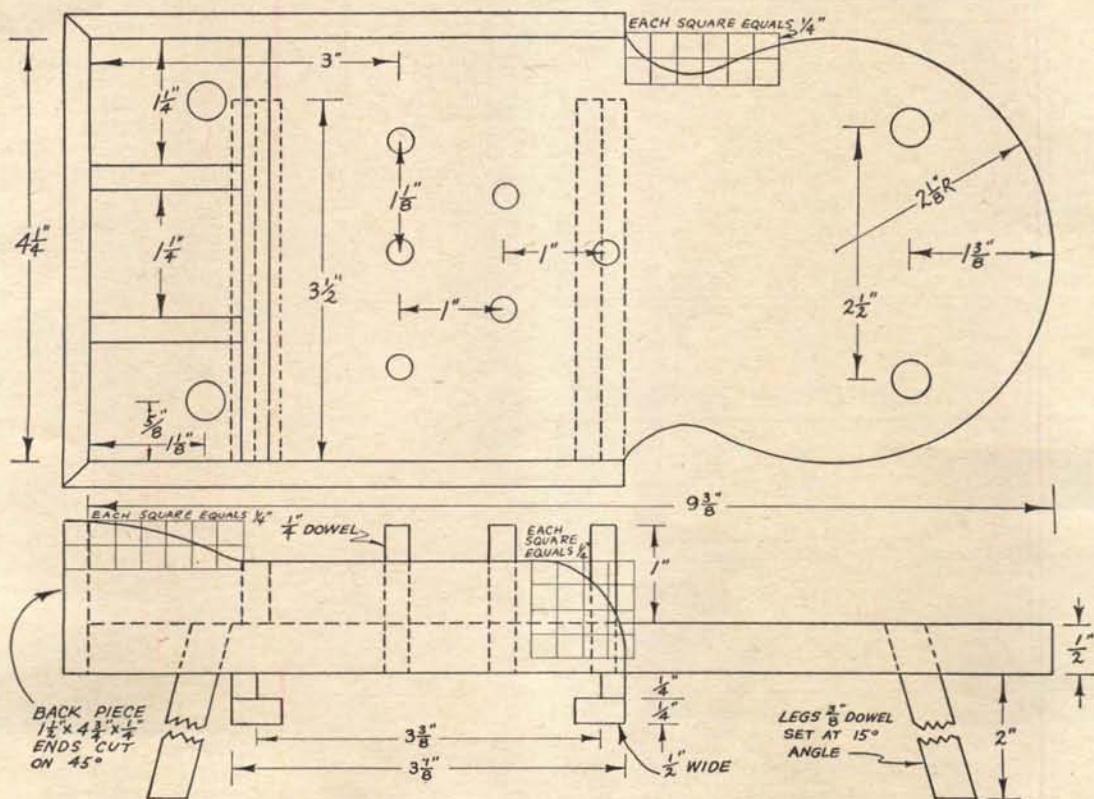
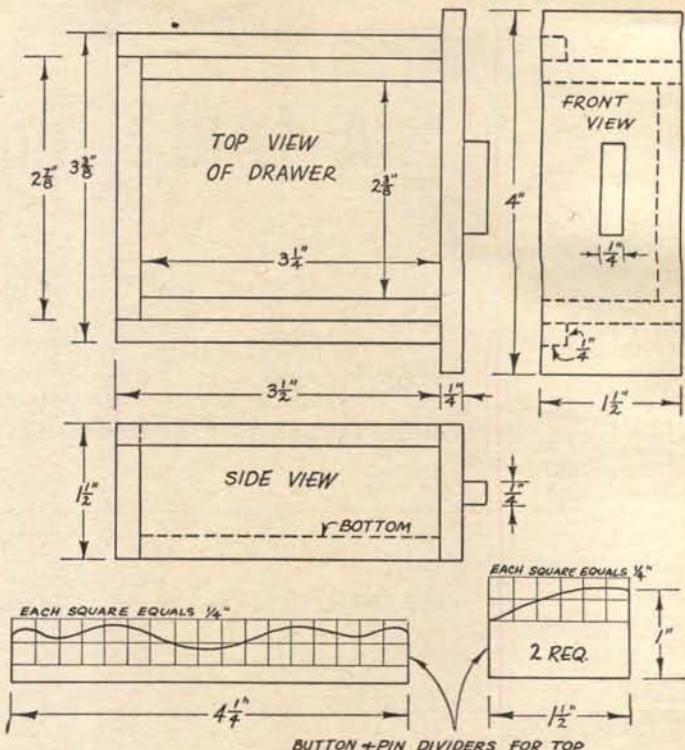
THIS LITTLE sewing bench in the form of a miniature cobbler's bench can be both useful and ornamental. Carry it out under the shade trees or to the porch to finish those little sewing jobs that just don't seem to get done. Constructed of scrap plywood, it is made entirely of $\frac{1}{4}$ " stock except the base, which is $\frac{1}{2}$ " stock. The spools are held by $\frac{1}{4}$ " dowels and $\frac{3}{8}$ " dowels make the legs.

All curved parts are cut with a

jig saw, band saw or coping saw, after laying out by means of squares as shown. The tiny drawer slides on runners on the underside of the base. These runners are merely two pieces of $\frac{1}{4}$ " plywood $3\frac{1}{2}$ " long. One is $\frac{1}{4}$ " wide and the other $\frac{1}{2}$ " wide. They are nailed or glued together as shown. The tiny drawer has a corresponding $\frac{1}{4}$ " by $\frac{1}{4}$ " piece glued or nailed along each side near the top.

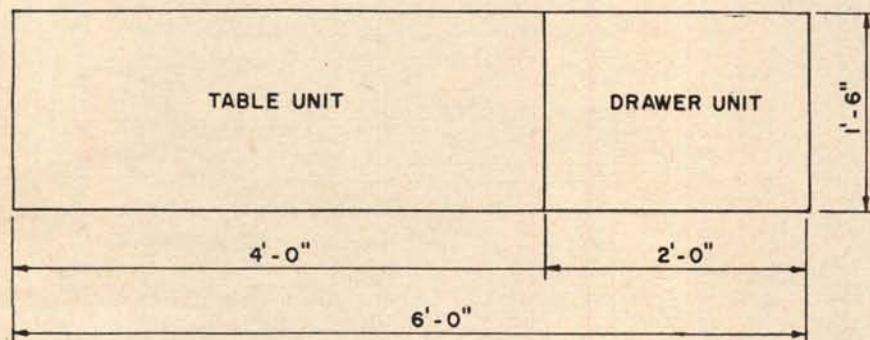
A tiny piece is glued to the front of the drawer for a handle.

When drilling the $\frac{3}{8}$ " holes in the base for the dowel legs, set them at about a 15-degree angle. Assemble all pieces with glue and brads. Round off and sandpaper all exposed edges. Stain the piece and then give it several coats of shellac, the final coat being rubbed down with No. 00 steel wool after it has set.

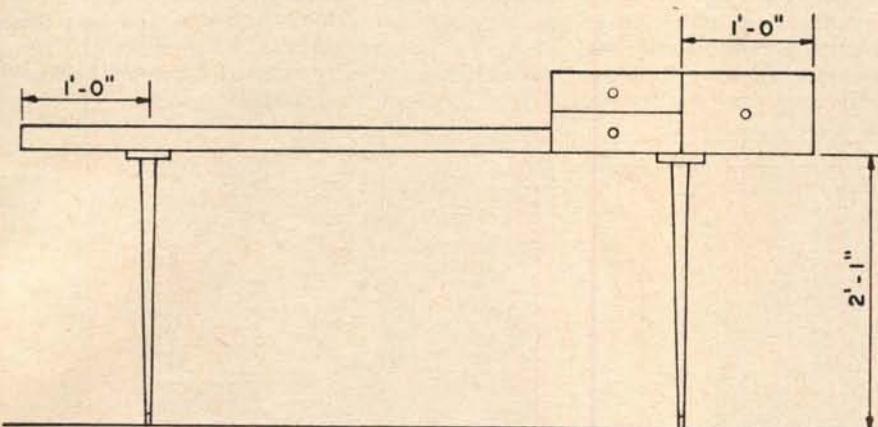


A TABLE that Serves TWO Purposes

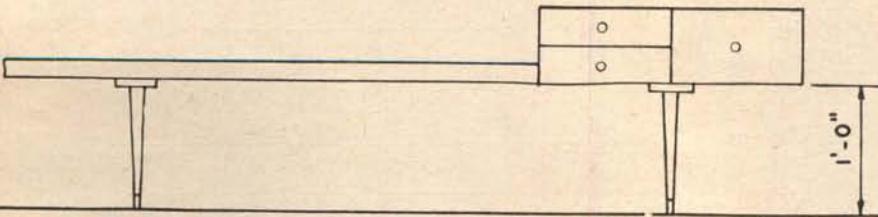
By an easy change of the length of its legs you can use this versatile piece of furniture either as a bedroom beauty center or a coffee-cocktail table.



PLAN VIEW



STANDARD VANITY HEIGHT



COFFEE TABLE HEIGHT

THIS STYLISH table that serves either as a bedroom beauty center or an attractive living room coffee or cocktail table has the appearance of a piece of custom-built furniture.

As a beauty center, the bi-level table is a central spot for keeping all beautifying supplies and in itself adds beauty to a bedroom. As a coffee table, it has a roomy top for magazines, ash trays and other knickknacks. Three drawers in one section provide room for storing perfume bottles and cosmetics or for coasters, napkins and silverware, depending on the use to which you put the table.

The finished table is 6' long and 1½" wide. The table and drawer sections are constructed separately and then bolted together. Legs for a beauty center should be 2' 1" long and those for a coffee table 1' long. By interchanging the legs, which are held in place by screws, the table can be used for either purpose.

Your lumber or hardware dealer will be able to offer you a choice of drawer pulls as well as having on hand metal or wooden legs in various heights to suit your particular needs.

Construction Hints

ASSEMBLE THE drawer unit by carefully following all specifications in the drawer unit details. The Tempered Preswood top and bottom of the drawer unit, as well as the drawer bottoms should be fastened with 2d finishing nails 4" on center. All drawer faces should be glued with a quality woodworking adhesive. Ease the edges of the drawer guides with sandpaper or a plane for easy operation.

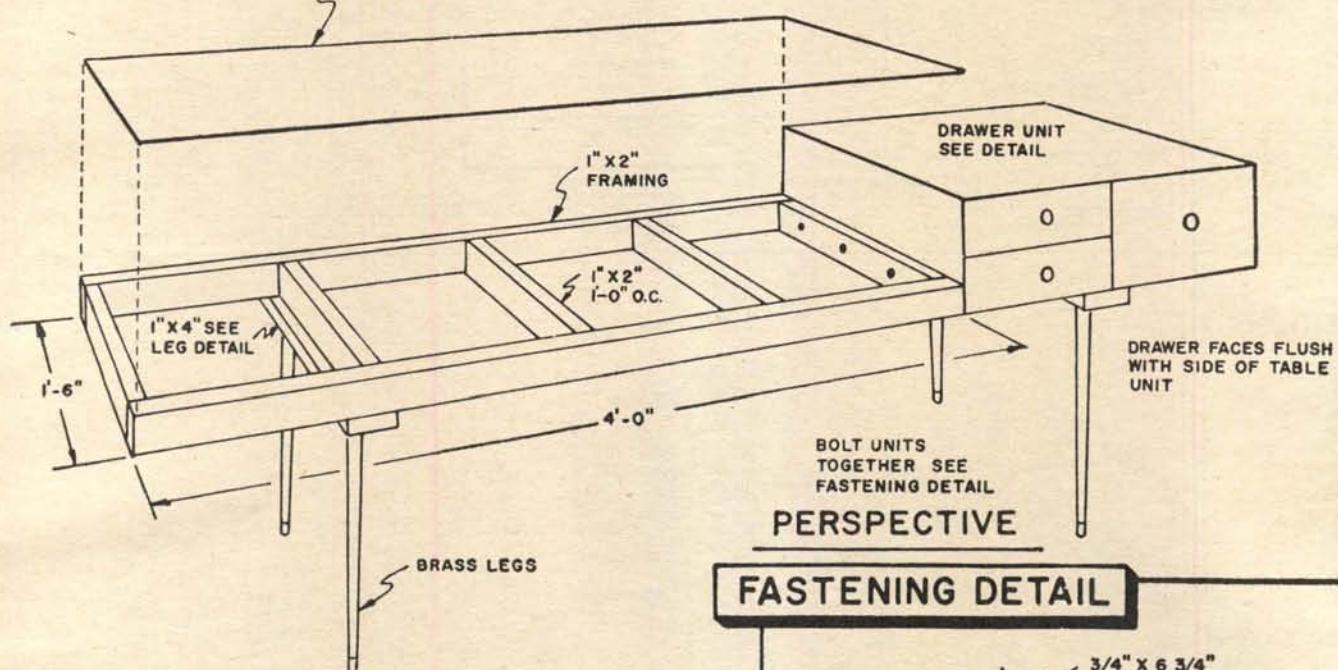
Table unit framing should be bolted to the drawer unit as shown in the fastening detail. Apply the Tempered Preswood table top with a quality woodworking adhesive. Secure brass legs to 1" x 4"s as shown, using a leg height that fills your needs.

Finish the Tempered Preswood panels with a primer coat or sealer followed by one or two coats of paint. For a high gloss finish use an enamel undercoat followed by a finish coat of enamel. For an especially smooth and shiny finish use successive coats of lacquer, sanding between each coat. In all cases follow manufacturer's specifications.



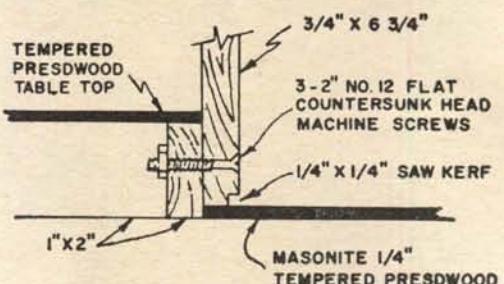
THE TABLE in use as a bedroom beauty center.

MASONITE 1/4" TEMPERED
PRESWOOD TOP

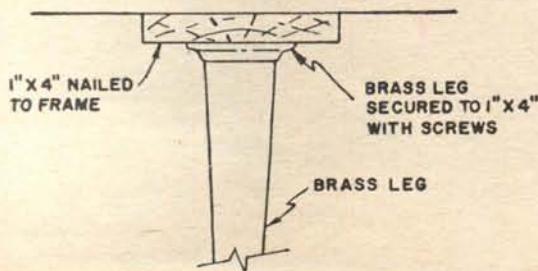


PERSPECTIVE

FASTENING DETAIL



LEG DETAIL

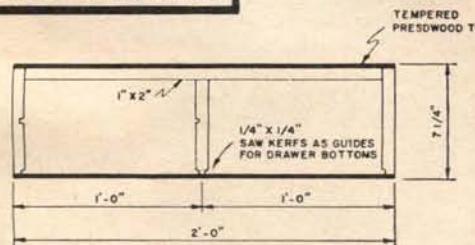


Bill of Materials

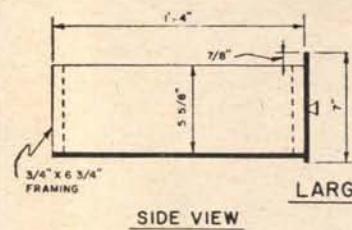
NO. OF PIECES	SIZE	DESCRIPTION
1	4' x 6'	Masonite 1/4" Tempered Preswood
1	1" x 8" x 8"	Lumber
1	1" x 6" x 4'	Lumber
1	1" x 4" x 4'	Lumber
1	1" x 3" x 10'	Lumber
2	1" x 2" x 10'	Lumber

Miscellaneous: Drawer Pulls, Adhesive, Brass Legs

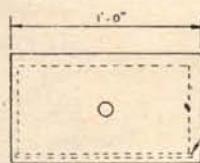
DRAWER UNIT DETAILS



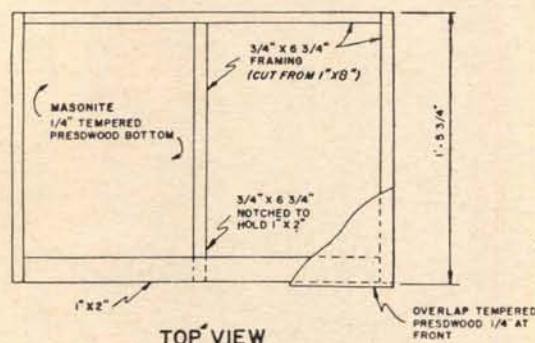
DRAWER UNIT
FRONT VIEW



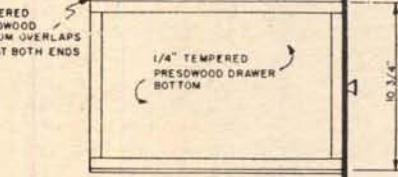
LARGE DRAWER



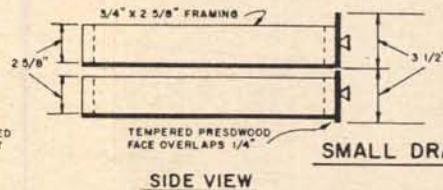
FRONT VIEW



TOP VIEW



TOP VIEW
FOR LARGE AND SMALL
DRAWERS

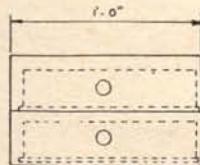


SMALL DRAWERS

SIDE VIEW

NOTE: ALL DRAWER FRONTS MASONITE
1/4" TEMPERED PRESWOOD

OVERLAP LARGE DRAWER FRONT 3/4"
ON RIGHT SIDE. SMALL DRAWER FRONT
3/4" ON LEFT SIDE. OVERLAP ALL
DRAWERS 3/8" AT CENTER

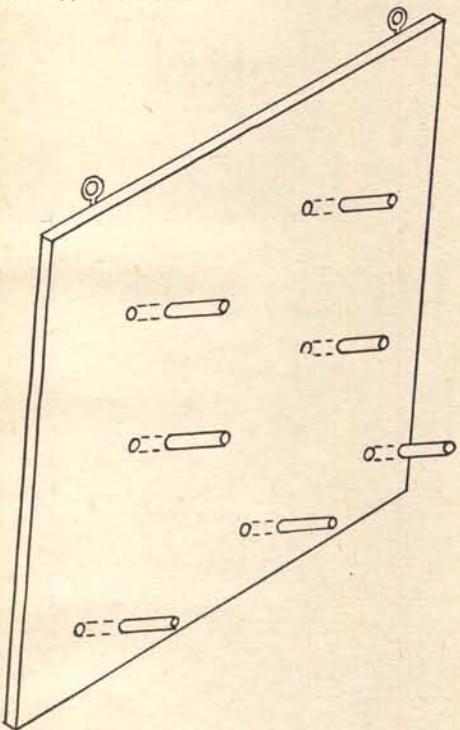


FRONT VIEW



WITH SHORTER LEGS, the table doubles as a convenient, trim lined coffee or cocktail table.

MAKE FROM $\frac{3}{4}$ " plywood and use $\frac{1}{4}$ " doweling for the pegs. The number of guns that are to be hung determines dimensions and number of pegs. Set $\frac{3}{4}$ " wire brads in such a position as to support the muzzles.



IT MAY never have occurred to you gun loving fathers that the rack on the wall of your den holding your favorite hunting pieces may be the

A Gun Rack for Junior

WEBSTER P. TAYLOR

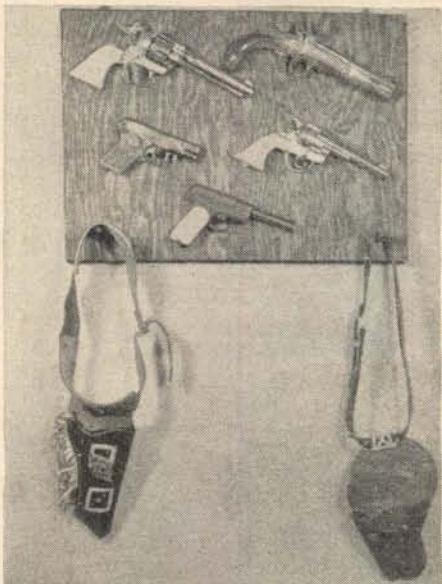
envy of your gun toting cowpoke of a son. But don't kid yourself, dad, that boy of yours is just as proud of his 98 cent cap pistol as you are of that \$125 Winchester and he probably uses it a lot more.

With a gun rack of his own the boy will not only be proud of his own display of guns but will keep them on the rack when not in use and won't always be pestering you or his mother with that cry of "Where's my six shooter?"

A pistol rack such as the one shown is almost sure to please a small boy and is easy to make. It shouldn't take more than a half hour or so of your time—a half hour that will pay big dividends.

The rack is made of $\frac{3}{4}$ " plywood, the dimensions being determined by the number of guns Junior has to display. The pegs for holding the guns are $\frac{1}{4}$ " doweling cut 2" in length and set in the plywood to a depth of $\frac{1}{2}$ ". After the pegs have been set, the guns should be positioned on the board while lying flat and $\frac{3}{4}$ " wire brads driven into the board in such a position as to support the muzzles of the guns at the angle desired. A light coat of mahogany or walnut stain gives a good finish and a couple

of screw eyes in the top of the board provide the means of hanging the board on the wall with ordinary picture hangers.



THE NUMBER of toy pistols to be hung on it determines the dimensions of this gun rack designed for a youngster.

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The success of your present and future high fidelity musical reproduction unit will depend greatly on the care and foresight with which you plan your speaker system.

A Guide to Selecting Hi-Fi Loudspeakers

LAWRENCE J. EPSTEIN

WHILE A complete high fidelity unit consists of a record turntable, radio tuner and amplifier as well as a loudspeaker and enclosure, it is only with these two latter components that the do-it-himselfer can make his own contribution to the end result of his music system—the reproduction of recorded music.

All the other components, whether placed on a shelf, put in a cage, or installed in elaborate cabinetry, will deliver the identical signal to the speaker. But what the speaker does with that signal depends almost completely upon its relationship to its enclosure—which may be purchased completely finished, assembled from a kit, or built from scratch.

The loudspeaker and its enclosure must be planned together as a speaker **system**, a system which when planned correctly can start with one speaker and later be easily expanded to a more elaborate multiple speaker system.

But only when the prospective audiophile is aware of the wide variety of speakers and all the ways they can affect the final results of his high fidelity unit can he intelligently begin to make his first selections from all the components on the market today.

A COMPONENT familiar to even the nontechnical layman, the loud-

speaker is the device which interprets the electrical impulses received from the electronic portions of a home music system, converting that energy into corresponding mechanical vibration which in turn creates intelligible sound. The fidelity with which the resulting sound compares to the original of the source is determined in great part by the quality of the materials used, the care taken in manufacture and, of course, the design of the loudspeaker. As the last link in the chain, a music reproducing system is no better than the speaker it employs.

More than anything else, the unyielding laws of physics underscore the design of the relatively simple-looking loudspeaker. In operation, it is highly complex, but by applying the science of acoustics as developed to date, high fidelity equipment can today give the real thing a good run for the money.

Speakers used in conventional radio consoles are of the mass produced variety. Since cost objectives determine design and fabrication technique, refinements which will make a world of difference in performance usually are not incorporated. Hi-fi speakers truly worthy of that designation are literally handmade, custom-built affairs, generously endowed with more costly amounts of critical materials.

Nevertheless, even amongst the producers of fine speakers, there are differences of opinion and technique. You will more easily note differences between various brands and types of speakers than will be detected among brands of quality amplifiers, tuners, etc. Since there are also wide variations in hearing ability between individuals, one's own judgment is a fairly reliable criterion in selecting a loudspeaker. Bear in mind, however, that hi-fi might at first exposure sound unfamiliar, since many of the lower fundamentals and overtones are rarely heard on conventional sets. Listen for a while before choosing. Once you've accustomed yourself to the new vistas of music listening, a comparison with the old set at home will readily reveal the pleasures which have been missed in the past.

As a rule, the truly reputable and successful brands, probably names you've never known before, will appeal to the majority of people. Hence their popularity. Prices do not always indicate the measure of quality, nor for that matter does appearance; but you will find there do exist mean values for each category of speaker type.

THE FOLLOWING will help you to recognize the general types available and the terminology used in literature and advertising.



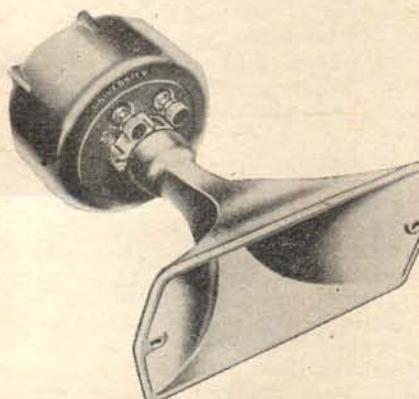
PHOTOGRAPH 1—A loudspeaker specially built for specifically the best possible reproduction of the low frequency tones, it is often referred to as a woofer.



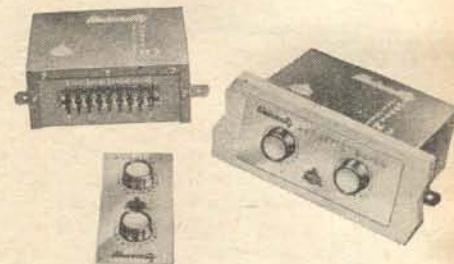
PHOTOGRAPH 2—Unlike in appearances to most speakers, this combination of horn and energizing "driver unit" is particularly designed to reproduce best the middle register of music and at the same time spread out the sound which at those frequencies begins to become directive.



PHOTOGRAPH 4—An "extended range" speaker which reproduces a very wide range of musical tones. The larger cone portion of the speaker concentrates on the low frequencies, thus serving essentially as a "woofer", while the "diffusione" element at the apex of the cone emits the midrange and high frequencies.

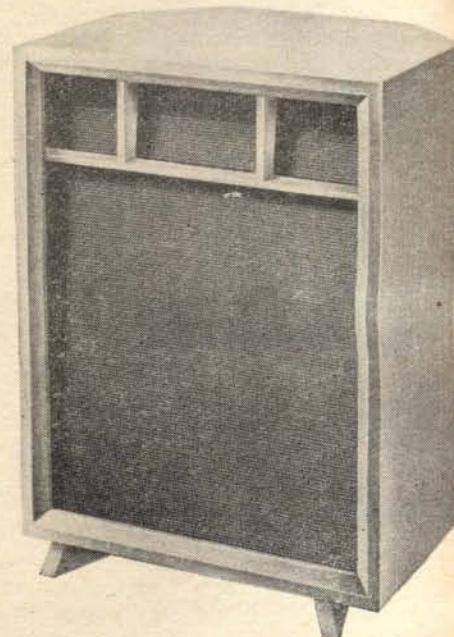


PHOTOGRAPH 3—Similar to the midrange speaker in Photograph 2, this somewhat smaller speaker renders superior performance at the very high notes and also spreads in a wide listening arc this extremely directional range. It is called a tweeter.



PHOTOGRAPH 6—A component known as the "crossover network", it separates the musical spectrum into the three ranges which are then fed to the woofer, midrange, and tweeter speakers so that each reproduces only those tones for which they were designed. This particular type of network has "presence" and "brilliance" controls for adjustment of the sound to suit room acoustics and personal taste. The speaker in Photograph 5 has a built-in network.

PHOTOGRAPH 7—The performance of the woofer is much dependent upon the enclosure (baffle) in which it is placed. Conventional radio cabinets are rarely of adequate size, design and quality. The enclosure shown is typical of attractive types available for housing either the extended range and integrally-built 3-way speakers, or the individual components of a 2-way or 3-way system. It will also allow for progressive expansion of a speaker system from 1-way to 3-way as the budget permits.



PHOTOGRAPH 5—A speaker which combines the speaker of Photograph 4 and the tweeter of Photograph 3, and thus functions as a 3-way speaker with integrally built components. It is referred to as a 3-way Diffaxial. The individual components of (1), (2) and (3) can also be installed as a 3-way speaker system into a suitable cabinet.

WHILE IN the final analysis it is the actual performance of a piece of equipment, as aurally appraised, that may best serve to guide the hi-fi novice in making selections, determining the **wisest** purchase requires a bit more thought. A book could be written on that one subject alone, but it will boil down to this:

There are no commonly accepted standards of measurement or of determining specification ratings of speakers; thus, a direct comparison of brands based on manufacturers' claims can be misleading to other than the well-informed. For example, "frequency response" ratings are intended to convey the extent to which a speaker is capable of reproducing the musical spectrum. However, the level of the sound output of the speaker throughout the given range is an equally important measure of just how much of response is **usable**; such comparative data is not generally available **between** brands.

Much will be read about magnet weights and types. Within limits, it is not so much a matter of how much Alnico 5 material (grade of magnet) is used as it is **how well** it is used in the speaker's over-all design. The more efficient a speaker, the better can its performance be made, and Alnico weight does contribute to the end result. But, if the design of the other elements of a speaker (cone, diaphragm, voice coil assembly, suspension, etc.) are poor, much of the magnet is wasted. The more efficient the speaker, the less amplifier power required. This also often results in less distortion output. Thus a comparison of magnet weights is generally an acceptable guide more between **models of a brand** rather than between brands. Also, the weight given for the total of magnetic **assembly** (this includes the soft iron superstructures, etc.) should not be confused with the weight of Alnico 5 magnet material alone (this is the important energizing part). Then too, there are different magnet designs, depending upon the intentions of the manufacturer. A large-looking magnet assembly is **not necessarily** a more efficient speaker than those of shallow design. As a rule of thumb, a hi-fi speaker (extended range type) should employ no less than one pound of actual Alnico 5 magnet material.

Power capacity ratings are important. Generally, the higher the better. Speaker power ratings are **not** intended to indicate the amount of amplifier power needed. They merely indicate the total power a speaker will safely accept without injury to its structures. The dynamic range of unrestricted hi-fi program material will produce occasional power peaks several times the power rating of the amplifier. The speaker should be capable of taking these sudden surges, or else distortion and possibly damage to the speaker will result.

The terms "dispersion" or "sound

distribution" convey the angle within which the speaker output produces usable sound for the response range given. Here too, the lack of standards makes written specification difficult to compare. Listen at extreme angles off the axis of speakers, when shopping, to determine how much of the high notes have been lost. Then walk across the path of the operating speaker (from a distance of several feet) and note the **degree** of change in loudness. There will be some, but the less, the better.

Specifications covering "impedance" present no problem. Let it suffice to say that with modern day amplifiers which are capable of matching to virtually any good speaker you may buy, all that is necessary is to make the proper connections during installation. As for resonance, there is considerable misunderstanding, even among the "experts," but by using the enclosures or data recommended by the manufacturer of the speaker, the entire rather involved matter is circumvented.

As a rule, in cone type speakers, the larger the diameter of the cone ("diaphragm"), the more bass fundamental will be heard, if all other factors remain comparable. However, the differences between brands is likely to upset this rule. Some 8" speakers in properly designed and well constructed enclosures are likely to sound as well as 12" or 15" speakers housed in price-compromised boxes. The enclosure for a cone speaker is as important to the final performance of a system as is the speaker it contains. Short cuts in that department show up easily. Bass is not as loud nor as deep as the speaker is capable of reproducing; there are spurious foreign buzzes and rattling noises produced by the cabinet setting up its own vibrations; and the speaker sounds either too boomy or as though it were in a barrel, or as though some of the musical spectrum is missing in different portions.

Making a wise purchase on the basis of brand comparisons is one thing; planning to purchase wisely is still another. Once exposed to hi-fi, it is difficult for the music lover to resist acquiring an ensemble. That purchase is generally based on a somewhat fixed dollar budget available at the time of purchase. So, the more money available, the better the system, or perhaps the more extensive the facilities.

However, since as in most other things, the better the equipment, the greater the pleasure derived, any limitations which may have been imposed by a limited budget during the initial purchase are likely to discourage future desirable improvement as funds become available. Unfortunately, the electronic equipment such as amplifiers and tuners do not lend themselves to much change in performance other than in additions of auxiliary devices which may not

have been originally incorporated. Almost nothing can be done to improve the mechanical devices such as record turntable, changers and tape recorders short of virtual substitution.

But fortunately, the loudspeaker, where relatively small changes produce immediately apparent aural improvement lends itself well to progressive alteration. This is true if some of the planning for the future is accomplished at the time of the initial purchase. It is possible, today, to expand speaker systems progressively from a simple single extended range speaker to finally a full-blown 3 or 4-way system **without** obsolescence of any of the speaker components purchased in each stage.

There are available cone speakers in various sizes which will serve initially as wide range reproducers, and then as the system expands may be used for woofer or midrange work. There are crossover networks which are adjustable for matching the original and subsequent speaker complement as the system is altered. And so on. Even the latest enclosure and baffle "kits" have additional cut-outs to accommodate expanding systems.

By using this approach in planning a hi-fi system purchase, even rather limited initial budget can be devoted to the purchase of better than average electronic and program source equipment which will still be the equal of the final speaker system. Qualified distributors of hi-fi equipment are well acquainted with this newly developed approach and are happy to guide the novice accordingly.

DO YOU have a speaker you'd like to improve? Perhaps a speaker system that needs that little something to make it just right? Maybe you're thinking of getting rid of what you have and want to start from scratch . . . the right way this time. Or, you could be one of the great many whose taste is greater than the current budget will accommodate. If so, you're wondering if there might be some way of starting a speaker system modestly but with an ultimate performance goal in mind, building it up in reasonably inexpensive stages without waste and obsolescence.

Until recently, it had been necessary to compromise the associated electronic program source equipment (either by eliminating features and services, or by accepting lower priced inferior merchandise) in order to reserve enough funds to purchase a decent speaker. Paradoxically, the tendency was to compromise at the electronic end.

This is no longer necessary. There have recently been developed design techniques enabling the consumer to spend the bulk of the initial budget on good program equipment—not merely merchandise labeled "hi fi," but equipment which **performs** hi fi;

so that whatever the brand of speaker selected, the program source will at least be capable of the reproducer's full capabilities.

There are now available such items as dual impedance range woofers, adjustable response woofers, versatile tweeters and midrange speakers, and networks that are adjustable to match varying impedance, crossover and rate of attenuation requirements. The prospective purchaser can choose to his heart's content from a great selection of possible speaker combinations which meet his budget, space and listening requirements.

LET US assume you own a speaker—a fairly decent "extended" or "wide-range" type—and you've developed your hi-fi listening taste to the point where you feel more output at the high end (in level or frequency re-

those of the cone speaker for most pleasing over-all tonal quality. Later on, more "presence" can be added to the system by addition of a "midrange" horn/driver unit combination speaker, as shown in Figure B. The increase in efficiency of the middle register tones brought about in this manner will serve to make the sound reproduced in the room seem as though it originates in the room rather than from a loudspeaker behind a grille cloth in a cabinet.

Now let us say you have a 2-way system or perhaps a 2-way "coaxial" with built-in tweeter. If it's bass you're lacking you could either add a woofer (the adjustable response type) or you can employ the present woofer (especially if it's a 12" job) as a midrange unit by boxing it in to help reduce low-end response. Then add a good 15" theater type

ent crossover to obtain the tonal quality best suited to the related components and your personal taste. Figure D illustrates a system in which the woofer and tweeter are the original elements (complete with network) and additional midrange is introduced in order to give the system more "presence." By adding the larger tweeter with lower horn cut-off frequency, it is operated as a midrange speaker. Together with its adjustable associated network it may be set for a most pleasing over-all tonal balance.

However, if you are starting from "scratch" and cost is a factor, you have two alternatives. If you want to begin with the minimum, get a good but reasonably priced wide-range speaker. Spend the rest of your money on the best electronic and program source equipment you can afford. Later, add a tweeter with an adjustable crossover network, and still later a midrange speaker with a suitable adjustable network.

There are networks available that are not only adjustable in crossover frequency and impedance match, but may also be used as 2-way networks, and as 3-way networks when in combination. If you are able to start with a good but reasonably priced 2-way system and have intentions of making further improvements in time, you might begin with an adjustable response 12" woofer, adjustable network and tweeter. Later you can add the midrange (or vice versa) together with its adjustable network. An adjustable response woofer in this case is ideal for such procedure since it adapts itself so well to changes in application and circuit modification. Figure D shows such a system.

Finally, no one likes the idea of throwing away a usable article. So, whatever speakers you finally decide upon, select components that offer the greatest versatility of application and flexibility of operation. In this way, as personal listening tastes develop and possibly change, or room acoustics are altered in the home, you will at least be reasonably assured that the system can be re-adjusted or further improved to meet the new operating conditions.

In keeping with the philosophy of designing speakers permitting progressive expansion, enclosures are available, designed and built to accommodate as many variations of speaker combinations as are practically possible. This helps matters considerably in view of the high cost of fine wood. So, Mr. and Mrs. Audiophile, be sure to ask the right questions when you go shopping for that well-deserved hi-fi system. Make each penny count and waste none of them . . . it's not as difficult as some would have you believe.

The author of the foregoing article is director of sales and merchandising for University Loudspeakers, Inc., White Plains, New York.

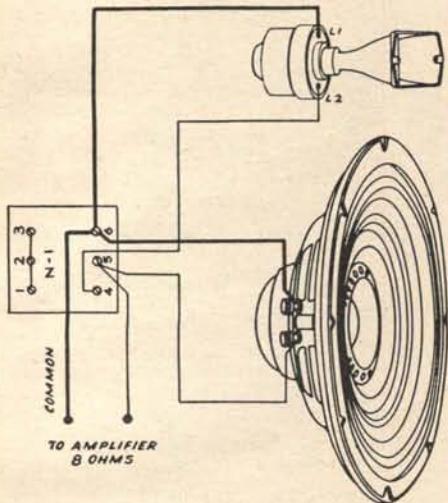


FIGURE A

sponse) would improve performance. Figure A shows how a tweeter can be added. The adjustable high pass filter, in this case complete with built-in "brilliance" balance control, can be set to start the tweeter at various frequencies from 1,250 to 5,000 cycles. This enables you to match the tweeter characteristics to

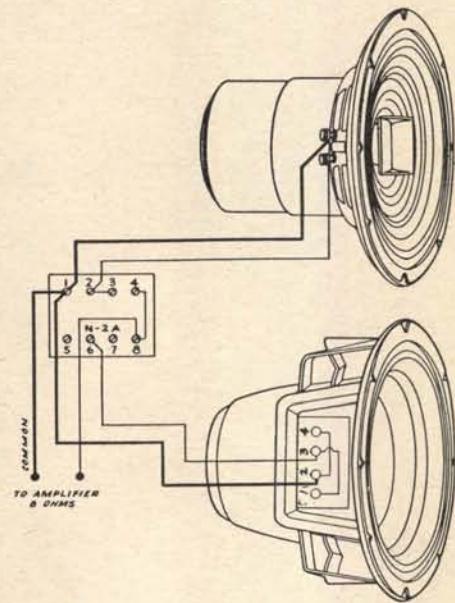


FIGURE C

woofer, perhaps one with adjustable impedance voice coil to match the 8-, or 16-ohm speakers with which it is used and which will also enable you to divide the power from the amplifier among the various speakers. Figure C shows such an arrangement, complete with a network which is also adjustable for differ-

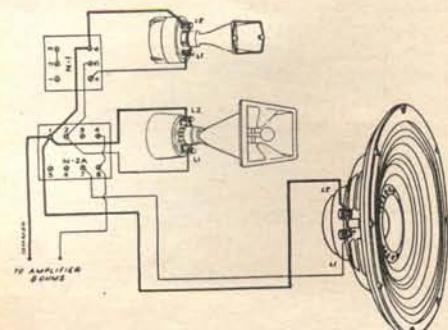


FIGURE B

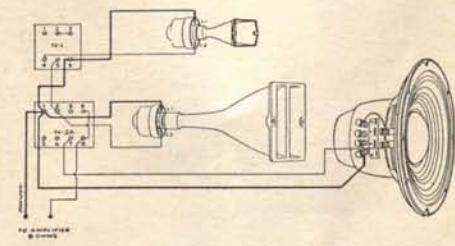
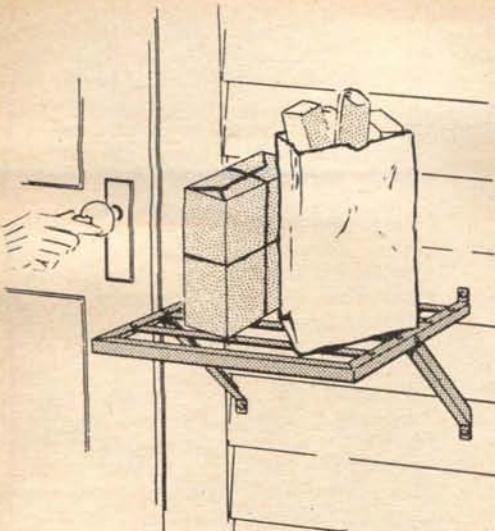
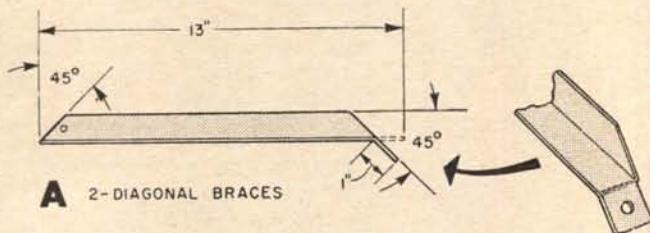
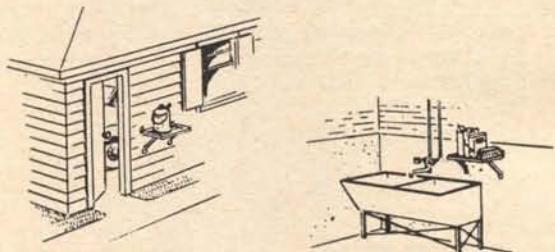


FIGURE D

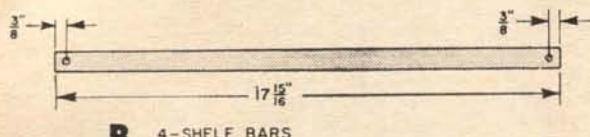
Add this Back Door Porch Shelf



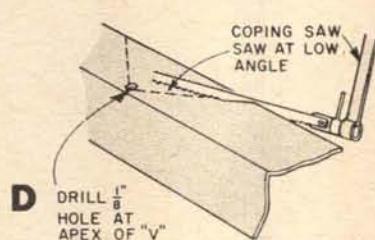
PUT AN end to groping for your house key while your arms are laden with sacks of groceries. This handy back door utility shelf will provide a place to put them while you unlock the door. Dozens of other uses will be found around the home for this versatile and easily constructed shelf.



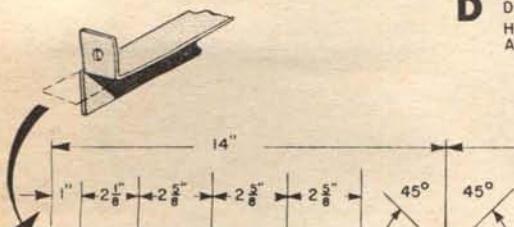
A 2-DIAGONAL BRACES



B 4-SHELF BARS



D DRILL $\frac{1}{8}$ " HOLE AT APEX OF "V"



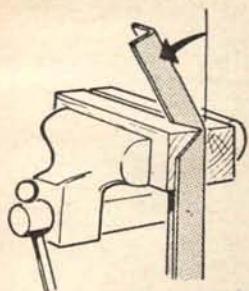
C 1-TOP FRAME OF SHELF

MATERIALS LIST

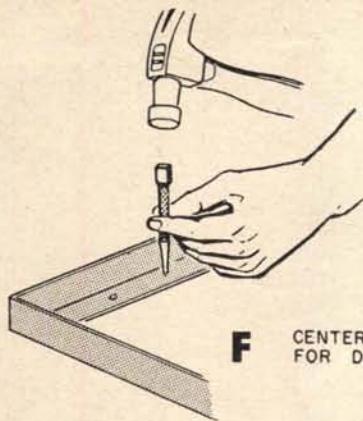
- 1 pc. 1/16" x 1" x 1" aluminum angle, 6 feet long
- 1 pc. 1/8" x 3/4" aluminum bar, 6 feet long
- 1 pkg. 1/8" dia. x 3/8" aluminum rivets
- 4 No. 10 screws or 3/16" toggle bolts

CONSTRUCTION AND INSTALLATION

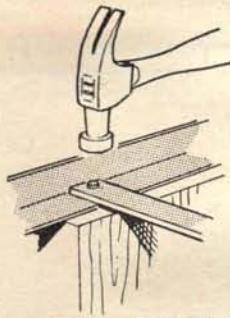
1. Cut 2 pieces of 1" x 1" aluminum angle 13" long. Measure back 2" on one end and cut one flange of angle at 45 degrees. Saw out remainder of the flange and bend the opposite flange downward at 45 degrees (Figure A). Cut other end of angle at 45 degrees. Drill 1/4" hole in notched and bent end and 1/8" hole in other end as shown.
2. Cut shelf bars as shown in Figure B, from the 1/8" x 3/4" aluminum bar. Center punch hole locations and drill 1/8" holes.



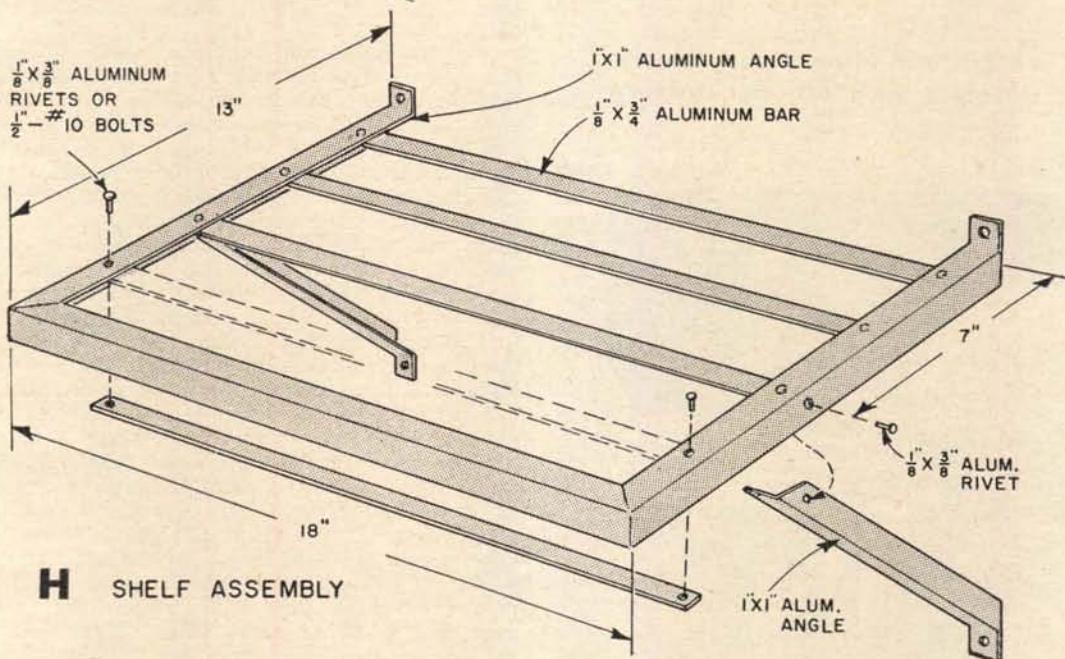
E MAKE SHARP BENDS IN A VISE



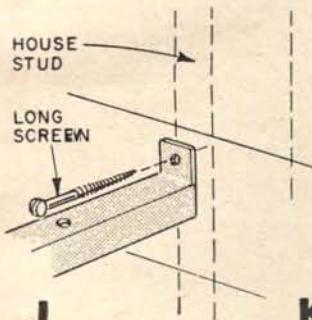
F CENTER PUNCH HOLES FOR DRILLING



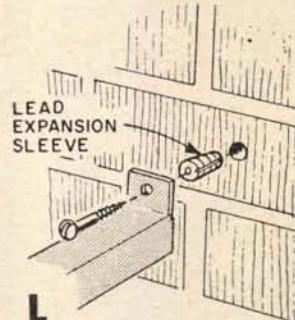
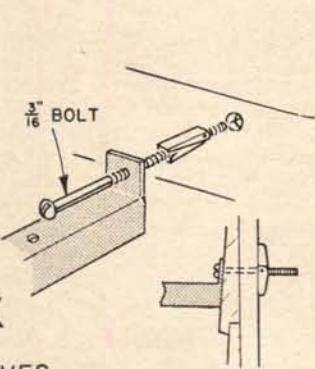
G FORM RIVETS



H SHELF ASSEMBLY

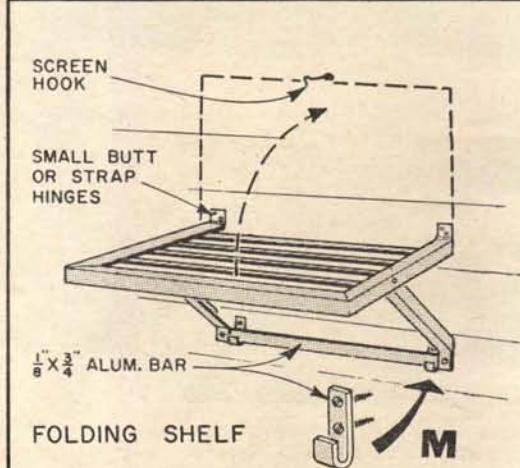


J ATTACHING SHELVES



The shelf may also be mounted so that it can be swung up out of the way when not in use. Simply rivet or bolt a piece of $\frac{1}{8}$ " x $\frac{3}{4}$ " aluminum bar across the bottom (Figure M), form the two "J" shaped supports, mount hinges as shown, provide a screen hook and presto! You have a folding shelf.

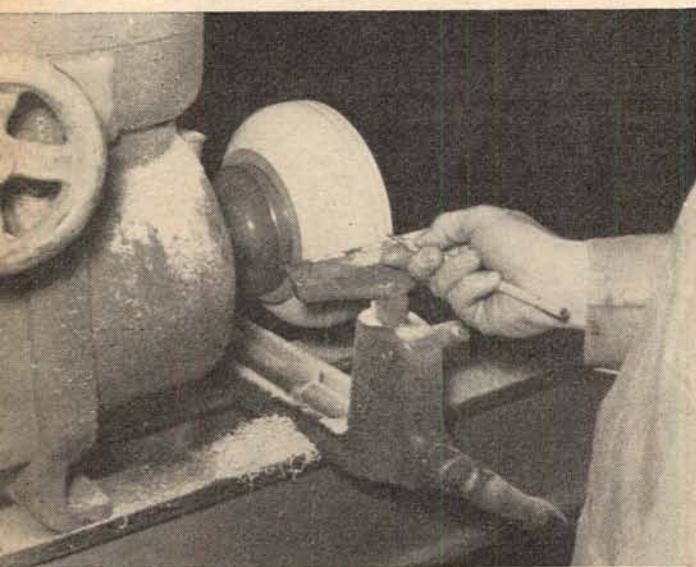
3. Cut 46" length of 1" x 1" angle. Notch out ends and bend remaining flanges 90 degrees (Figure C).
4. Cut "vees" (Figure D).
5. Bend to form top frame of shelf (Figure E). Center punch hole locations and drill $\frac{1}{8}$ " holes.
6. Attach shelf bars to the underside of the top flange (Figure G) using $\frac{1}{8}$ " x $\frac{3}{8}$ " aluminum rivets or $\frac{1}{2}$ " No. 10 bolts.
7. Complete assembly as shown in Figure H. Shelf may be mounted by any of the means shown in Figures J, K, L or M.



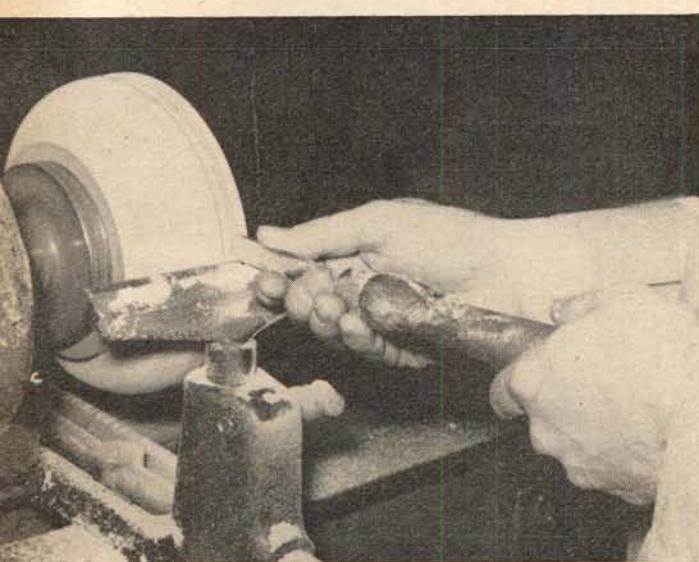
Inlays Beautify Wood Turnings

JAMES E. SEITZ

Inlays available in strip form make it easy for the wood turner to decorate such objects as lamp bases and bowls.



PHOTOGRAPH 1—Marking lines for the groove with a sharply-pointed pencil. The pencil is held against the wood while it is revolving. Only the outside has been shaped.



PHOTOGRAPH 2—Grooving between the lines with the parting tool. A narrow, square-nosed chisel could be used also. This operation requires a high degree of accuracy.

EVERY CRAFTSMAN on occasion needs to give his work some form of decoration. The wood turner is no exception but unlike others who often need extra tools and unusual abilities to decorate their work, he has for his use the process of inlaying, which requires only the ordinary equipment and skill in wood turning.

To complete his work the wood turner is not placed in the position of the cabinetmaker, for example, who must make use of the wood carver's special tools and skills to add decoration, nor is he like the finisher who needs the knack of an artist to paint an appropriate design on his job. Yet the wood turner has the satisfaction of knowing that by inlaying, his decoration can be made permanent—not wearing away with time but lasting as long as the project it beautifies.

Inlaying is a rather easy and inexpensive means of making attractive projects of otherwise plain woodwork. An inlay may cost only a few cents but when properly applied the beauty it affords should increase the value of the complete work well beyond the cost of adding the decoration. The author has more than doubled the sales value of wood turnings this way. To do similarly you may think that the touch of a master craftsman is needed. Such skill is not necessarily required, however, for even the beginning "lathe hand" should experience little difficulty when following the necessary procedures.

For doing this work, inlays may be had in strip form. These are flat woods all made standard in size to 1/20" thickness and 3-foot length but ranging in width from about $\frac{1}{8}$ " to 1". Different woods are built-up and glued in these sizes to form multicolored bands of various geometric designs, from simple lines in some of the narrow ones to more complex interlaced patterns in the greater widths. All such inlays are for use on wood turnings where the surface is generally cylindrical in shape in a manner to be described in detail later. Lamp bases, boxes, and bowls are examples of objects to which they are applied.

INLAYS AS described here are available commercially. The several companies handling them publish price catalogues showing the strips in color with the cost of each one as listed, apparently depending on its size and the intricacy of its pattern. However, cost is not the only consideration when buying them. How well the inlay is suited for the work needing decoration must be considered also.

Because the beauty of inlaid work depends on the fitness of the inlay for the project, inlay strips must be selected with care. Generally speaking, those of subdued colors are for use on narrow surfaces, while the large areas are reserved for the vivid colors. Since inlays tend to draw attention from the complete design, select one that affords a pleasing effect with the project on which it is to be used. While it is important that an inlay never be used to create gaudiness, it should not, on the other hand, lack some contrast with the wood of the project. It is necessary for good design, therefore, that a dark wood such as walnut be given a light colored inlay. The lighter woods require darker strips.

Keeping these rules in mind will help assure best results when decorating wood turnings.

In addition to cost and suitability, there are two other considerations when purchasing the strips. For one thing, it is not advisable to keep inlays for great lengths because they may become difficult to use due to dampening and drying out through an extended period of storage. This could be the result of buying too many at one time. On the other hand there is a saving of cost and time by buying in groups of six or so compared to buying that many one-at-a-time. What to buy then is a matter requiring knowledge of the different projects to be inlaid. It becomes necessary to plan ahead in this respect.

WHEN INLAYING the strips the procedure is very much the same regardless of the wood turning. It can be said with certainty that the rules of design and processes involved in adding the decoration to one turned project apply to others made similarly. To illustrate, steps in inlaying a bowl are given.

Begin the bowl by turning only the outside to shape before doing the inlaying. This is important. First of all, a bowl is no longer perfectly round when shaped inside and outside. This warping, however slight, is due to stresses within the wood as the fibers are cut while making the side thin. The result is that a groove for the inlay cannot be made to uniform depth. By leaving the inside unshaped the grooving can be done properly. Any warping that results while the bowl is completed will do no harm if the inlaying has been done before.

After the outside has been shaped, begin the inlaying by first marking two lines on the wood (Photograph 1). Draw the lines on the periphery of the wood at a position above true center. The correct position is at the visual or optical center which satisfies the artist's rule of balance (Figure A). At this place the wood must be flat, or nearly so, because inlay strips cannot be set in surfaces which taper greatly. When drawing the lines, space them a distance apart that is equal to the width of the strip selected. These lines serve as a guide while turning the groove (Photograph 2).

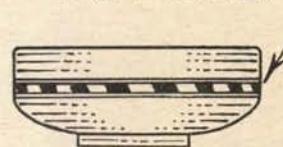
With a wood-turning chisel make the groove in depth equal to or slightly less than the thickness of the inlay and in width no greater than necessary to receive the strip. During this operation use the inlay strip to check the accuracy. If the groove is made too large, turn the surface smooth and attempt the operation once again. A correctly made groove will allow the inlay to be level or else extended a bit above the surface when put in place. This way a little sanding is required later.

Do the rest of the inlaying with the kind of care needed when making the groove fit for the inlay. Prepare the inlay strip for curving by dampening it with water. Then set the strip in the groove and cut it to length. Make certain that the ends meet squarely. Next, remove the strip while applying wood glue. By putting an ample amount in the groove none need be brushed on the strip. Now set the strip in place again (Photograph 3). As the glue is hardening, clamp the strip in place with a band of rubber inner tube.

It is necessary to emphasize here that for the bending operation the inlay should be made only slightly damp because glue will lose strength on a surface made too wet. Due to the uncertainty of the amount to apply, the wood turner may choose a second way of setting the strip. This way the strip is left unmoistened and glue is applied to its underside before bending. The inlaying is continued as before but more care is needed while handling the strip treated in this manner. Equally successful results can be obtained with the two methods.

To finish the process, allow the glue to harden. Then complete the bowl by turning the inside to shape and sanding the exposed surfaces. Now the inlaid bowl (Photograph 4) may be given a coating like any other wood turning but if it is to be used for something more than decoration, a nontoxic substance should be applied. Olive oil, mineral oil, and spar varnish are examples of such.

STRIP TOO LOW
AND TOO NEAR
TRUE CENTER



STRIP CORRECTLY
PLACED IN THE
OPTICAL CENTER

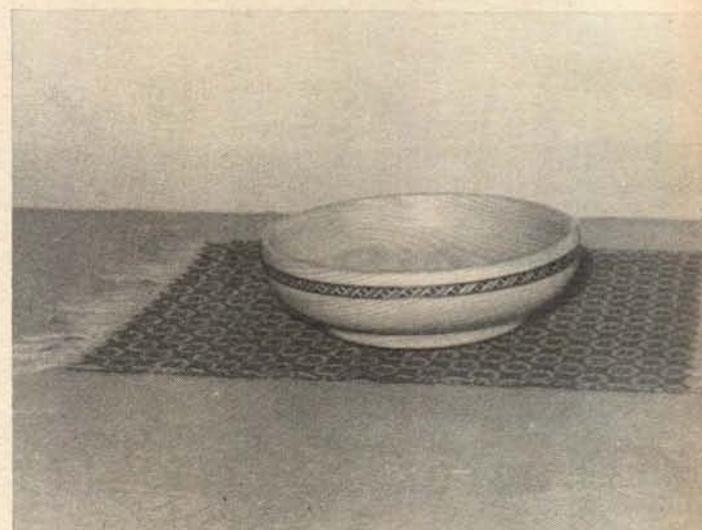


LOCATION OF AN INLAY STRIP ON A BOWL
TO SATISFY THE PRINCIPLE OF BALANCE.

FIGURE A

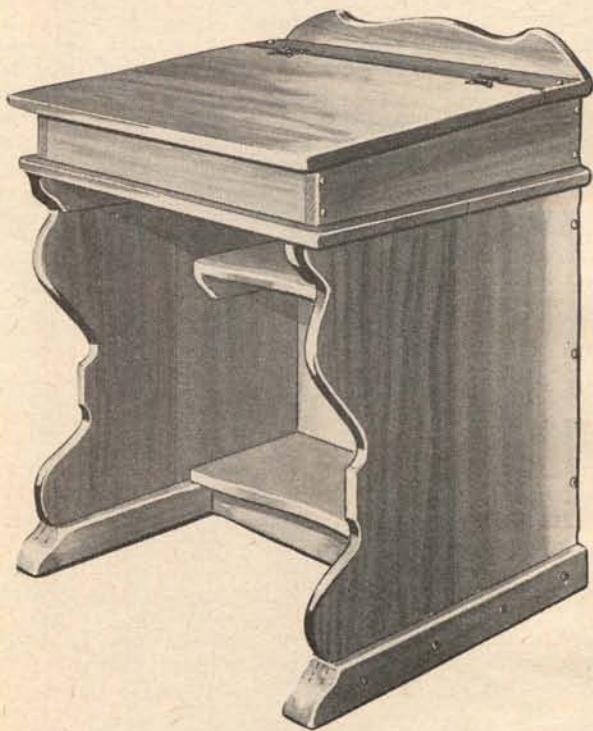


PHOTOGRAPH 3—Bending the inlay in place after glue was applied to the groove. A band of inner tube is used to hold the strip in place until the glue sets.



PHOTOGRAPH 4—This beautiful inlaid bowl serves well for holding fruits or nuts. When not being used for this purpose it makes an attractive centerpiece.

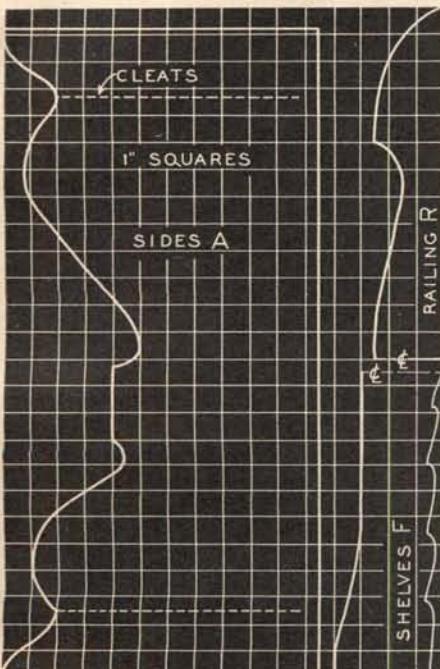
Reproduce this Early American piece which is as practical as it is attractive.



DESK top lifts to provide storage for pens and stationery; shelves are handy for reference books.

A Sea Captain's Desk that FITS on LAND

ROBERTA L. FAIRALL



PATTERNS for sides, railing, cleats and shelves.

MATERIALS LIST

The desk cuts from pine surfaced stock, 17 lineal feet of 1x12-inch material for members A, B, K, L, N, Q; 15 feet of 1x10-inch material for members F, G, S, H, M; and 27 feet of 1x3-inch material for members C, D, E, F, J, O, P, R, and T as follows:

Item	No. Rqd.	Description	Size
A	2	Sides (scroll-sawed section)	3/4" x 11 1/2" x 24 1/4"
B	2	Sides (back section)	3/4" x 11 1/2" x 24 1/4"
C	4	Side Cleats (top and bottom)	3/4" x 2 5/8" x 22 1/4"
D	2	Side Shelf Cleats	3/4" x 2 5/8" x 9 1/2"
E	1	Apron	3/4" x 2 5/8" x 21 1/2"
F	2	Shelves	3/4" x 9 1/2" x 23"
G	2	Back (outside boards)	3/4" x 9 1/2" x 24 1/4"
H	1	Back (middle board)	3/4" x 4" x 24 1/4"
I	3	Back Cleats	3/4" x 2 5/8" x 21 1/2"
J	2	Baseboard	3/4" x 2 5/8" x 23"
K	2	Bottom of desk compartment	3/4" x 11 1/2" x 26"
L	2	Compartment Sides	3/4" x 5" x 22 1/4"
M	1	Compartment Front	3/4" x 3 9/16" x 23"
N	1	Compartment Back	3/4" x 5" x 23"
O	1	Partition (long)	3/4" x 2 5/8" x 20 3/4"
P	1	Partition (short)	3/4" x 2 5/8" x 6"
Q	1	Top (back strip)	3/4" x 5" x 26"
R	1	Railing	3/4" x 2 5/8" x 26"
S	2	Desk Top	3/4" x 9 1/2" x 26"
T	2	Cleats for desk top	3/4" x 2 5/8" x 14"
Miscellaneous:			
2 forged iron hinges with a 1 1/2" joint.			
2 doz. 1/2", 3-prong furniture glides.			
2" and 1 1/4" No. 8 flathead wood screws.			
Finishing nails.			
White liquid resin glue.			
Wood filler.			
Exterior spar varnish.			

THE CAPTAIN'S desk comes ashore to provide a pleasant place to write or study. Interesting design makes it an appealing companion for Early American furnishings and small size promises a welcome in the little apartment, cottage or student's room.

You can build one in a short time with only hand tools and well seasoned Douglas fir 1-inch surfaced solid stock. Make full-size paper patterns enlarged from the squared drawing for contour pieces, then trace around them on the lumber. Lay out the remaining members, saw out and smooth up all parts with sandpaper; label pieces, and mark position of joints. Bore shank and countersink holes for screws.

Follow assembly details in the exploded drawing. For easy and strong jointing, first start in a couple of short finishing nails, next coat both surfaces with glue and drive in the finishing nails to hold glue under pressure while you drill short pilot holes through previously bored shank holes and turn in the screws. This method allows work to progress rapidly since no clamping or waiting for glue to dry is involved. A screwdriver bit to fit a brace is helpful in driving the many screws necessary.

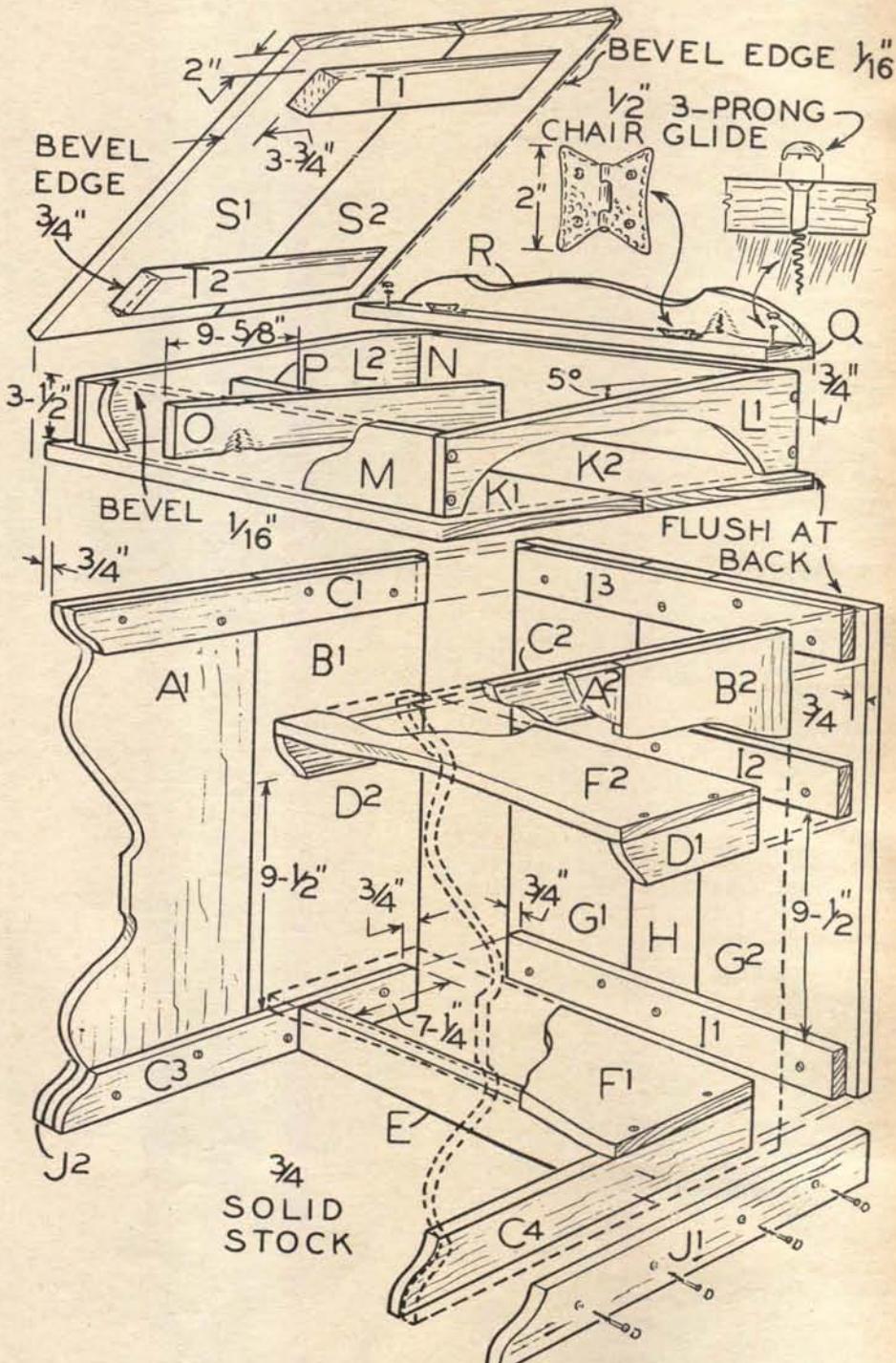
THESE ARE the construction steps:

1. Edge-glue sides A-B and join together with cleats C.
2. Join shelf cleats D to sides and nail apron E between cleats C.
3. Join shelves F to cleats.
4. Edge-glue back boards G-H and join them together with cleats I. Be sure the cleat I' is positioned accurately so it will fit under shelf F'.
5. Set back section in place and drive screws through sides and through the back into shelves.
6. Join baseboards J.
7. Assemble sides of compartment L, back and front M-N; then join bottom boards K, and set in partitions O-P.
8. Join back strip of top Q to railing R with screws turned in underneath Q. Attach to sides and back flush at back.
9. Position compartment over desk sides flush at the back and join with screws turned through K into cleats C and I.
10. Cleat desk top and hinge in place.
11. Round off all sharp edges and points with sandpaper. Tack chair glides over exposed screwheads on the outside of the desk to give a decorative doweled-joint appearance. Cover those on shelves and inside cleats with wood filler.

Finish with either a very light brown stain which has been wiped off after application or in the natural

color of the wood. Enamel the chair glides light brown. Enamel may be mixed by adding a little tube oil color to spar varnish. Stain may be mixed by adding the same tube oil color or enamel to a lot of turpentine.

Finally, give the piece two all-over coats of exterior spar varnish and dull the shine to a soft gloss by rubbing No. 4/0 steel wool with the grain. Bring up a soft luster with paste wax.



EXPLDED DRAWING reveals assembly details. All joints are set in glue.

Wrenches Work Better

MORTON J. SCHULTZ

Look after your wrenches and they'll do you a good turn when you need it.

SOME TOOLS are more delicate in appearance and more precise in their action than others, but all require proper care—even as solid a looking tool as a wrench. Improper care, using the wrong tool for a job, and not repairing minor damage while it is minor are things that send any once-useful tool to the scrap heap.

Depending on the nature and extent of your work, you may have a set of open-end wrenches, various-sized adjustable and pipe wrenches, and, if you putter around with your car, a set of box wrenches.

To keep a wrench free of rust, and to keep its jaws from being scarred or nicked by dirt particles and metal slivers, a wrench should be cleaned after you use it a few times.

First, wash grease, dirt and metal bits from the wrench's body and jaws with a cleaning solvent. Wipe it dry with a clean cloth.

Scour off any rust with a piece of steel wool or a crocus cloth. Put a light coat of preservative oil on those areas that have a tendency to rust.

CLEAN METAL CHIPS from the jaw serrations of pipe and box wrenches with a wire brush or a piece of flattened wire.



LUBRICATE the slide and worm of pipe and adjustable wrenches with a drop or two of oil.

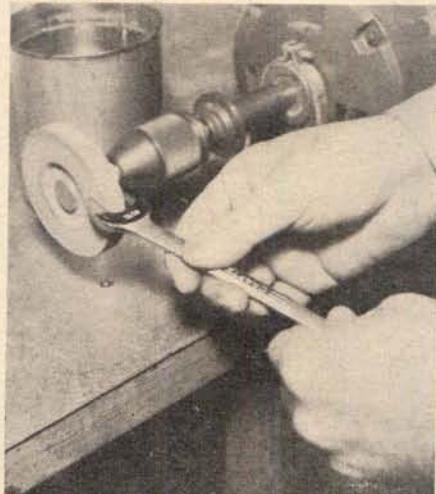
To keep the temper of the tool when repairing it by grinding, dip the wrench frequently into a pan of water.



WORN JAW SERRATIONS of pipe and box wrenches can be made serviceable again by carefully deepening the low points between serrations with a fine three-cornered or tapered file.

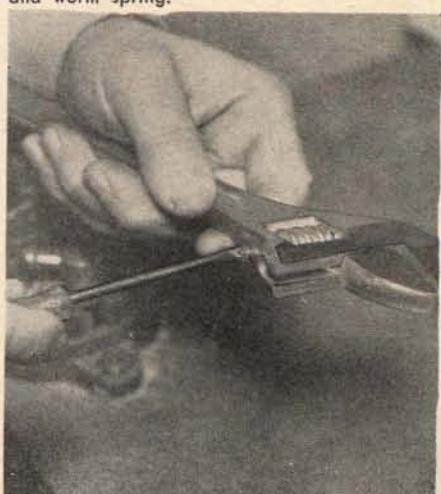
As soon as you notice a wrench is damaged, repair it before the damage gets so bad, the wrench becomes useless. Here's how:

IF AN OPEN-END or adjustable wrench has battered, nicked or spread jaws, grind or file the jaws perfectly flat and parallel. Enlarge open-end wrenches to the next standard size. For example, a battered $\frac{1}{4}$ " wrench can be made a useful $\frac{3}{8}$ " wrench.



Too much free play in the adjusting worm of adjustable and pipe wrenches can be eliminated like this:

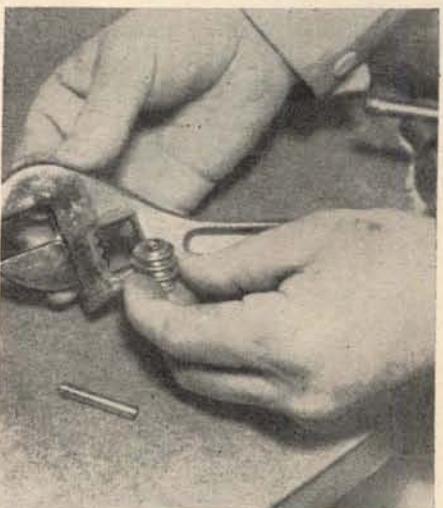
REMOVE THE SCREW which acts as the worm axle from the wrench, and lift out the worm and worm spring.



with Care



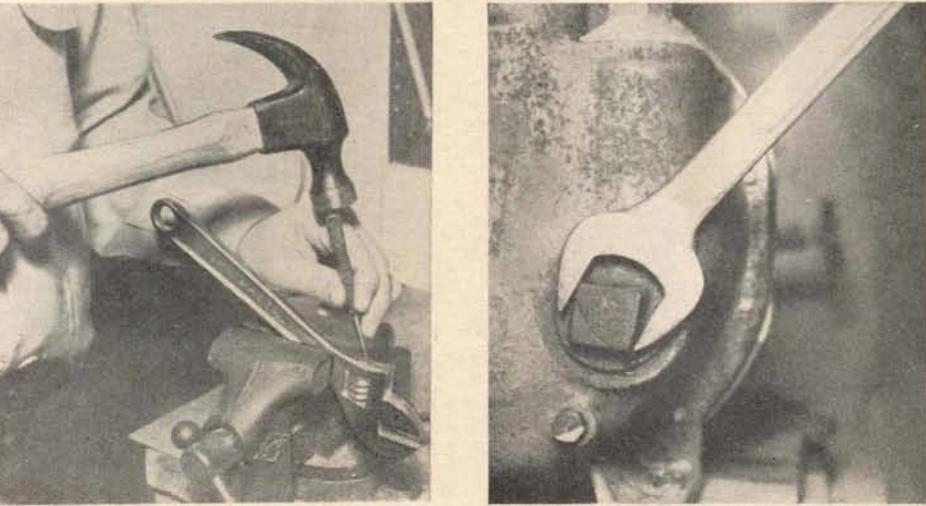
STRETCH the worm spring.



PUT THE SPRING back into the cupped end of the worm and put the worm back into the wrench. Tighten the worm axle screw.



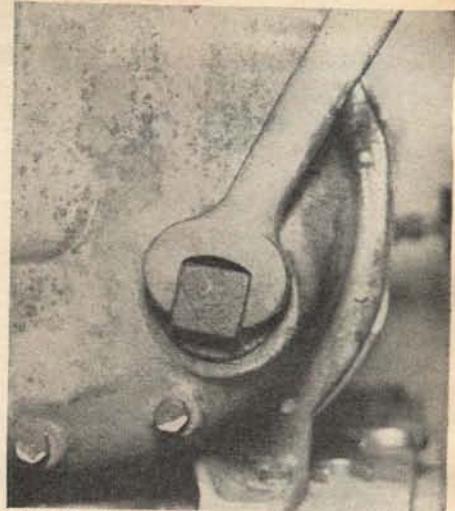
USING A PUNCH, strike the screw a sharp blow to lock it in place.



A WRENCH that doesn't fit the nut or bolt can cause the wrench's jaws to spread. It also batters the nut or bolt.



NEVER PUSH on a wrench—it's "knuckle-banging" dangerous.



ALWAYS USE the correct-sized wrench—it should fit the nut or bolt snugly.

Never strike the handle of your wrench with a hammer or anything harder than the palm of your hand—if you don't want a broken wrench.

If you can't gain enough leverage to loosen a nut or a bolt, try a wrench with a longer handle.



NEVER TURN adjustable wrenches so the pulling force is placed on the adjusting jaw. The wrench could slip or its jaws could buckle.



PULLING FORCE should always be received by the stationary jaw.

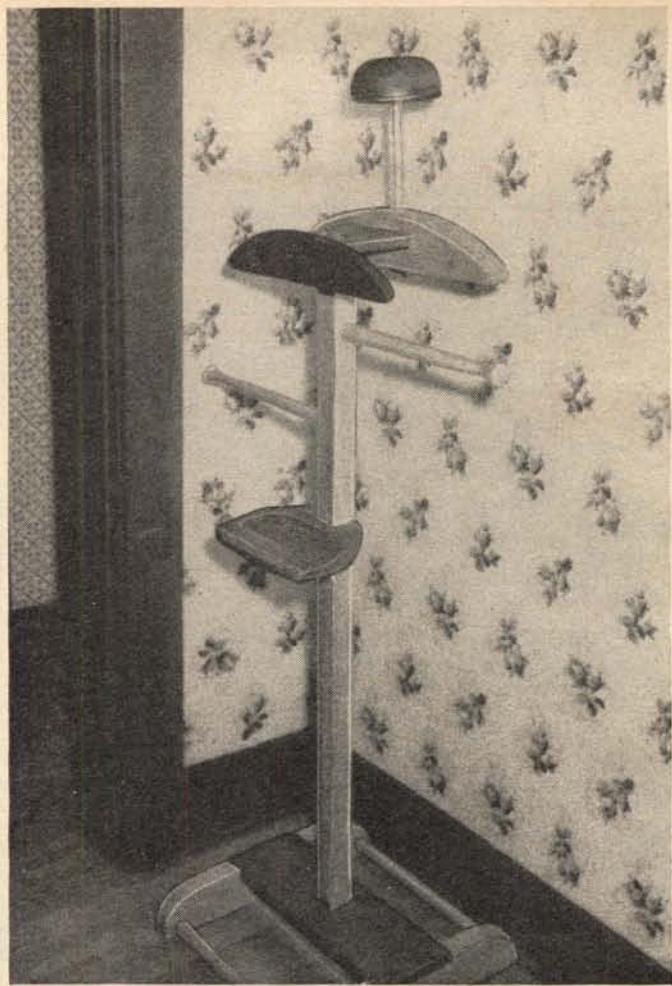
CLOTHES VALET

HUGH F. WILLIAMSON

This rack will make it easier for the man of the house to get dressed in the morning.



The valet in use.



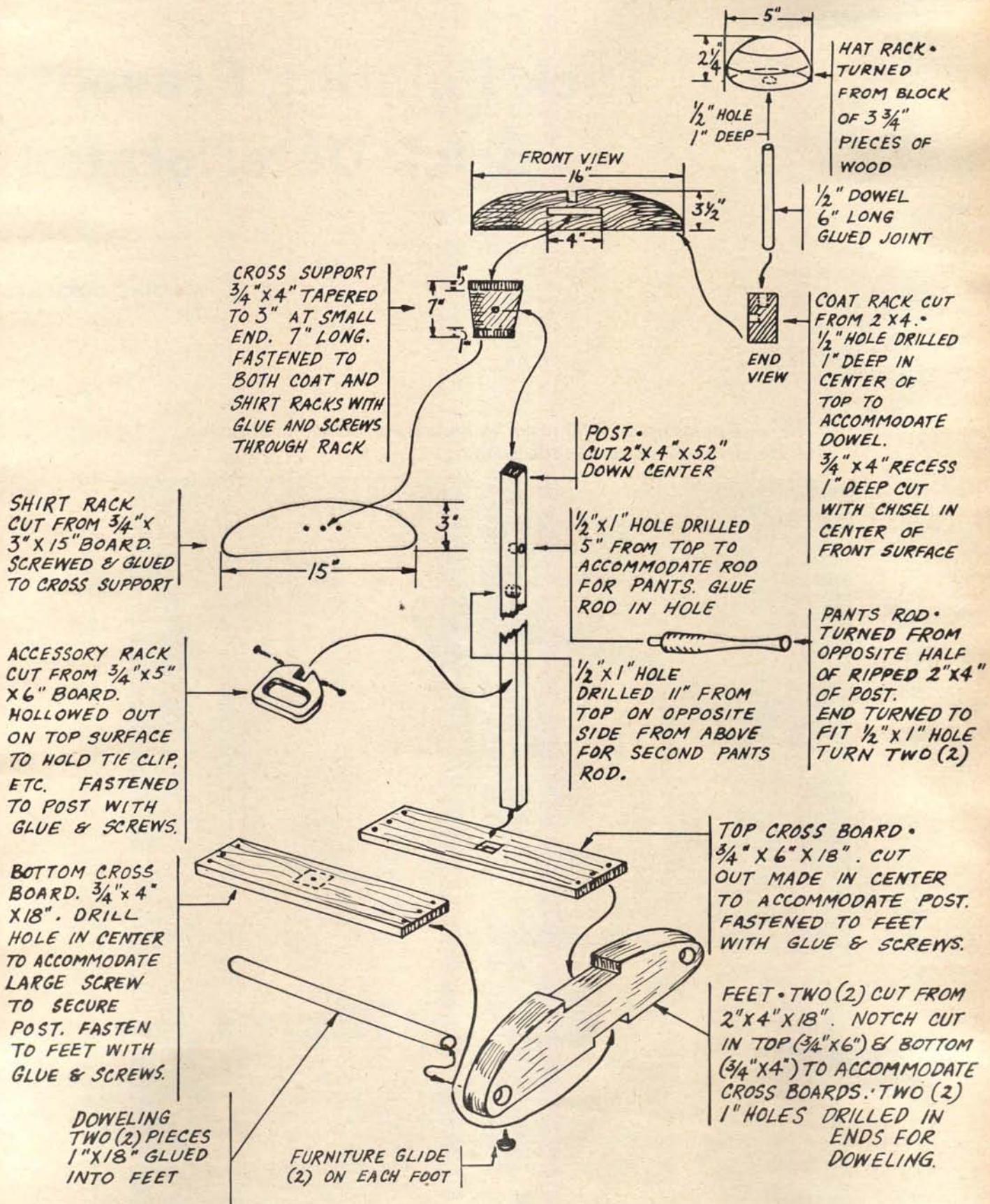
Completed valet.

THIS CLOTHES valet is easily made with hand or power tools in a few evenings and it will give the owner a great deal of daily satisfaction in use.

It helps do away with that frantic morning rush when the often sleepy-eyed riser is faced with such problems as what tie to wear with what shirt. If he is the planning-ahead type, he can lay out his complete wardrobe the night before, then sleep blissfully with at least one problem off his mind. This wooden valet is the next best thing to a human one.

Any article of clothing may be placed or removed from the valet without disturbing the other clothes. You will find a place for your coat, hat, shirt, trousers (two pairs), shoes (two pairs), tie, tie clip and cuff links.

The enclosed sketch and photographs are self-explanatory. Doweling can be substituted for the turned trouser rods if desired. The type of wood and finish is a matter of individual taste. All joints are secured by glue and wood screws. The dowel joints are glued in place and locked with a single finishing nail.



Tuck Pointing Prevents Brick Deterioration

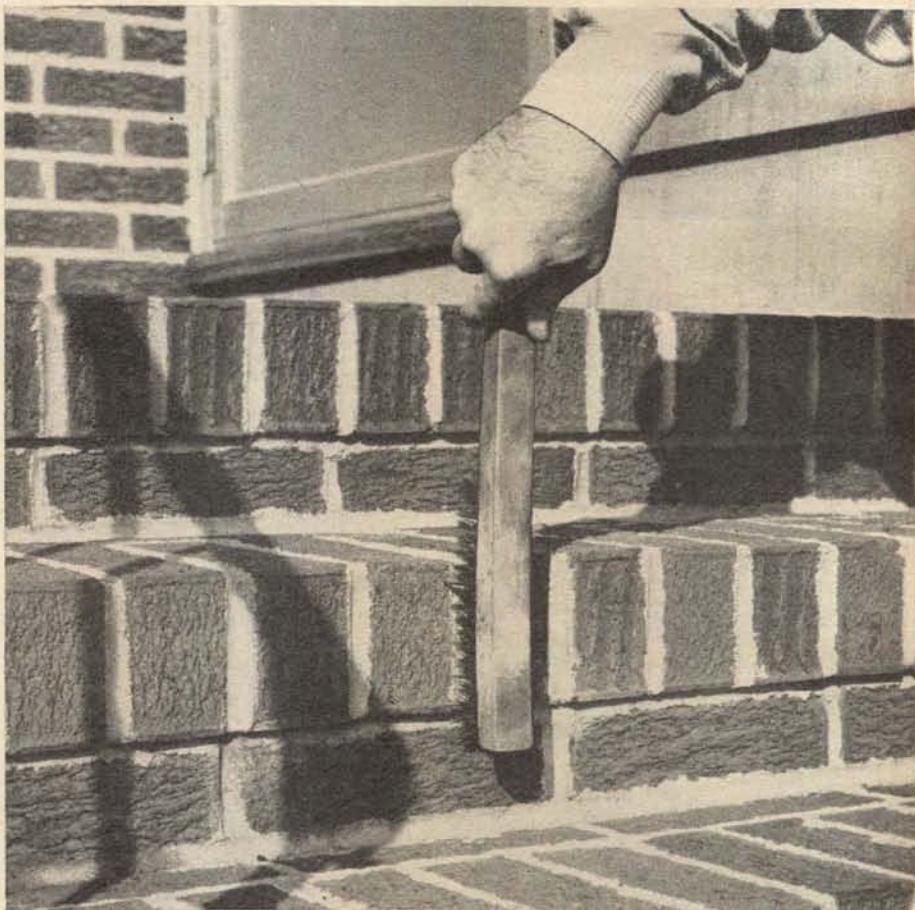
MORTON J. SCHULTZ

The wise householder will make an annual inspection of brickwork to see if the joints need tuck pointing.



PHOTOGRAPH 1—Tap away all loose mortar. Never lay heavy with the hammer—you could dislodge solid mortar and damage the brick. Remove only that mortar which can be tapped away or pried away with your fingers.

PHOTOGRAPH 2—With a brush, dust out all particles of loose mortar.



AS SPRING or fall comes around, homeowners who have any brickwork on their houses should keep two words in mind—tuck pointing. This simple process of reconditioning the joints between bricks could mean the prevention of future trouble.

The first sign that a joint needs repairing is the appearance of one or more hairline cracks where the mortar has pulled away from a brick. If the weakening of the mortar has gone far enough, a frostlike deposit, called efflorescence, usually appears on the face of the brick. This accumulation of soluble salts is washed out of the bricks and mortar when water enters the cracks. As the final deteriorating step, the bricks loosen up and lose their waterproof qualities, and the interior walls of your home can start leaking.

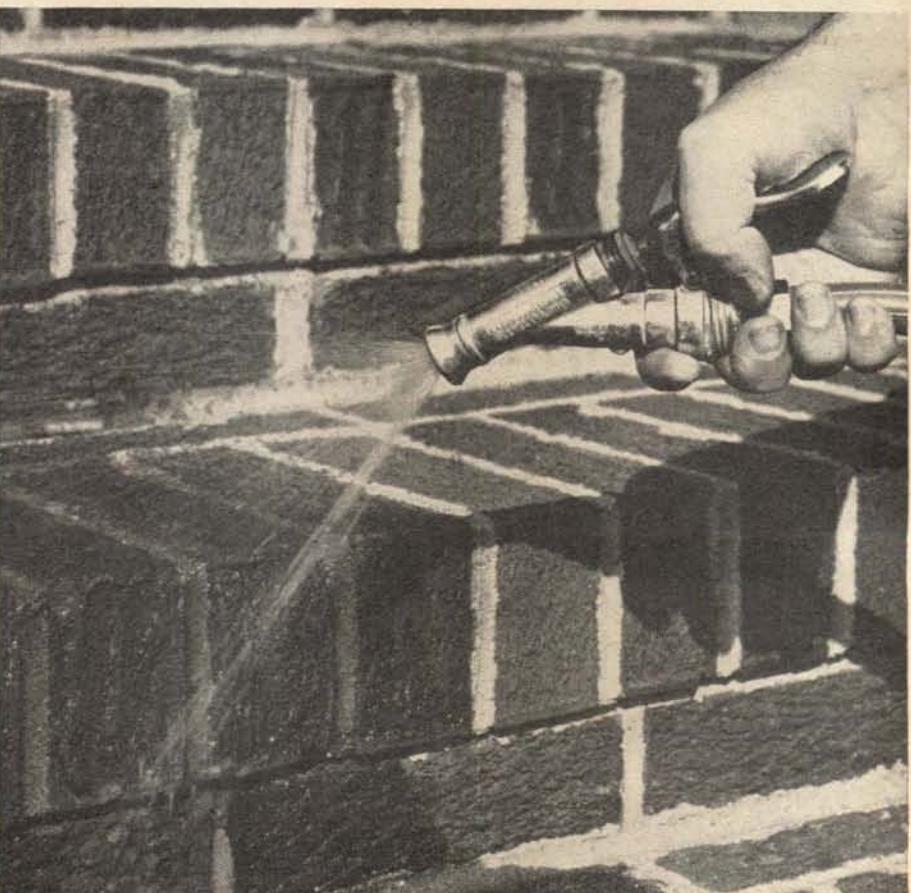
To avoid this, you should inspect brickwork annually and apply tuck pointing where needed. The materials and tools you'll need are:

1. Hammer or mallet, and a cold chisel, pick or old screwdriver. These are used to remove loose mortar around the brick.

2. A mortar-mix. You can use either ready-mix mortar, or you can mix it yourself. To make your own, mix one part of Portland cement, six parts of sand, one part of hydrated lime and water.

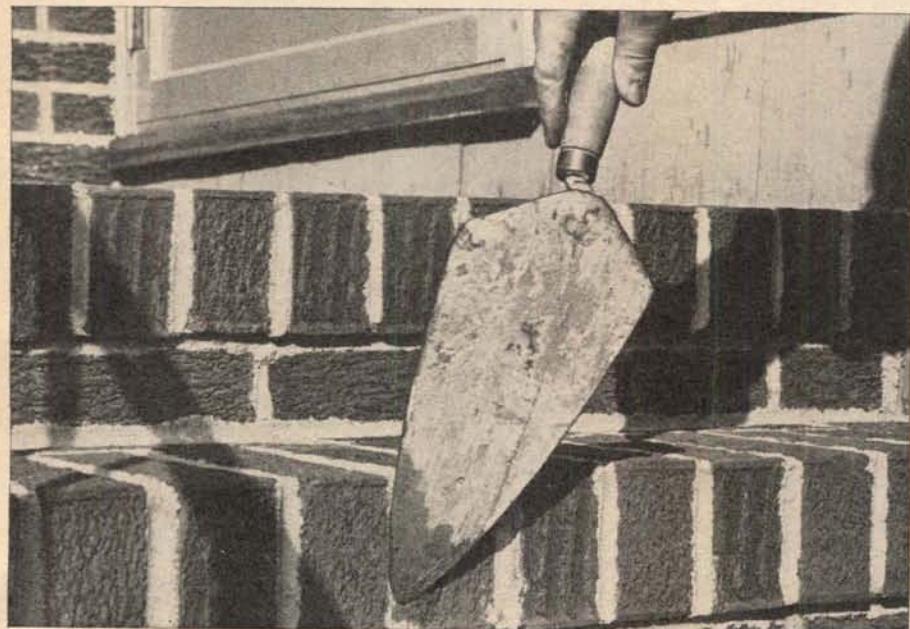
3. A pointed trowel to apply the mortar. Any size trowel is suitable as long as you can handle it easily.

The accompanying photographs show you how to tuck point.



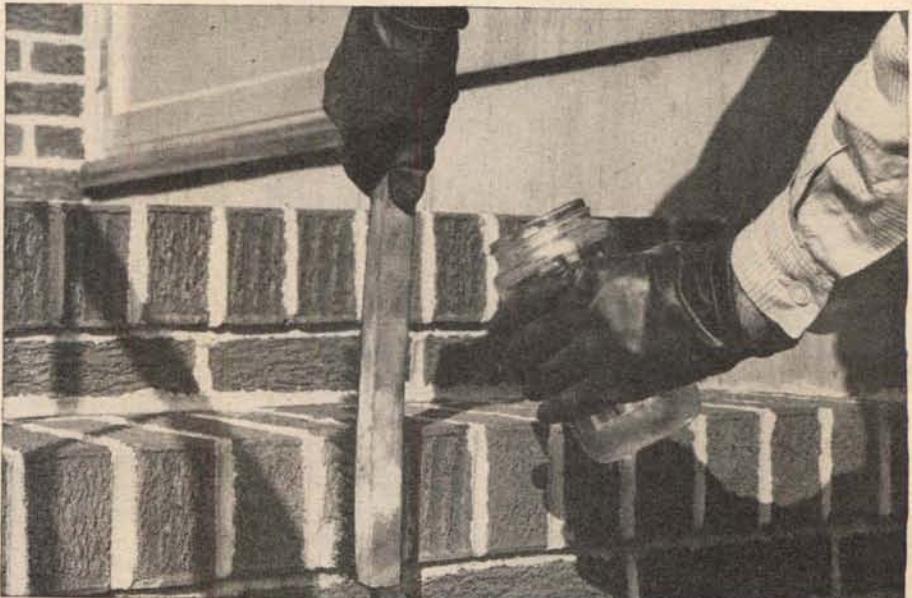
PHOTOGRAPH 3—Wet the cavity and surrounding area with water, as dry brick absorbs moisture from fresh mortar and prevents the mortar from congealing and adhering properly.

PHOTOGRAPH 4—With the trowel, apply some mortar to the cavity, filling it until the mortar is flush with the brick. Work with a small amount of mortar at a time, so you won't smear the face of the brick.



PHOTOGRAPH 5—Wait a few minutes and then press the trowel against the freshly-mortared joint. Now move the tool across the surface—first vertically, and then horizontally—to smooth out the job.

PHOTOGRAPH 6—if efflorescence is apparent, clean it off by scrubbing the brick with a mixture of one part of muriatic acid to 10 parts of water. Better wear rubber gloves. In case you should get any of the acid on your skin, flush it away with plenty of cold water.



Wall Finishes for Concrete Masonry

N. M. PITTMAN

THERE ARE two principal reasons for applying surface treatment to concrete masonry walls: 1. To enhance appearance with a colorful finish. 2. To help make the masonry units and the mortar joints on exterior surfaces weathertight.

In painting exterior surfaces for protection against moisture penetration, the paint should be applied to form a continuous film, with no pinholes or openings that will permit penetration of moisture. There are now available many finishes made especially for concrete masonry. These special paints can be obtained in a varied array of colors as well as clear finishes for both exterior and interior walls. The choice of finish depends upon the type of structure, the climatic conditions to which walls will be exposed, the appearance desired, and whether for interior or exterior walls.

Five types of concrete masonry finishes are listed below, with some comments on strong points and limitations of each. Check with your local dealer for detailed local problems.

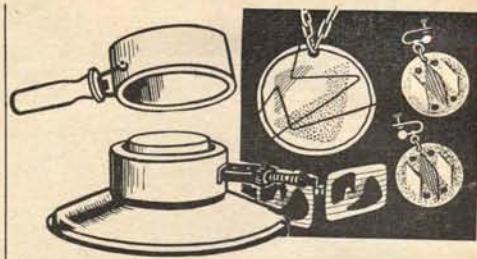
Cement-Water paints are water-dilutable paints with a binder of Portland cement which should not be less than 65 per cent by weight of total paint. These paints are especially suited to concrete masonry walls that are damp at the time of painting or are subject to dampness. A typical cement-water paint film is hard, strong and relatively brittle. Cement-water paint possesses good decorative qualities, good hiding power and color, and excellent durability. Addition of fine sand in primer coat helps conceal defects and fills texture. Method of applying and curing and conditions under which painting are done are very important. For exterior application, the following steps are recommended. Wall must be dampened prior to applying each coat. Paint is applied with a short, stiff-bristled brush, and paint is scrubbed into surface, starting with joints. Seal coat should be kept moist with fog spray for 12 hours, and at least 48 hours for finish coat. Portland cement paints are widely used for both interior and exterior masonry surfaces.

Resin-Emulsion paints are made of pigments ground in a vehicle of oil-extended resin which has been treated with an emulsifying agent allowing it to mix with water. This paint is easily applied with brush or spray and dries within a few hours to a smooth, opaque, flat finish. Walls are not wet down either before or after painting. This type of paint normally weathers by chalking, and has considerable elasticity. However, excessive moisture or alkaline salt solutions forming back of the film may cause blistering. Walls should be aged three weeks before applying resin-emulsion paints, which usually come in paste form, thinned to brushing consistency with water.

Oil-Base paints are usually ready-mixed, and contain opaque pigments suspended in drying oils and thinner. Oil-based paints designed for use on concrete masonry are usually made so that the first coat seals the surface sufficiently to prevent "spotting" of the second coat. Two coats, as a general rule, are necessary for good hiding power. Application of oil-based paints to damp surfaces is not recommended.

Synthetic Rubber paints are of two types: 1. The rubber-solution type, in which the synthetic rubber is added to a vehicle of drying oils, hydrocarbons, and coal tar thinners. 2. The rubber-emulsion type, in which the synthetic rubber is treated with an emulsifying agent so that the paste paint can be thinned with water. As these paints usually contain less pigment than many other exterior finishes, they are mainly used on interior walls. However, a two-coat application makes a good exterior finish. Rubber-based paints are used extensively for interior walls because of their ability to withstand repeated washings without harm to either adhesion or cohesion of the paint film.

Silicone Sealers provide a water-repellent seal that gives good protection, yet retains the original color and texture of the masonry walls. They should not be applied over oil or resin-base coatings, but can be used over cement-base paints. Can be brushed or sprayed.



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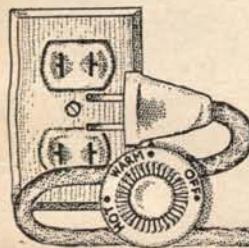
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Advice to apply to appliances

Part VI: Bulbs, Lamps, and Fixtures

J. J. LIGHTER

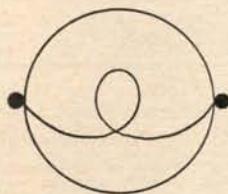


FIGURE 1—Electrical symbol for a bulb.

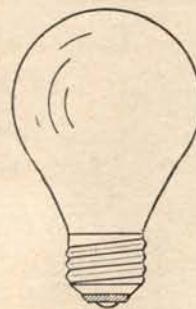


FIGURE 2—Edison (standard) base bulb.

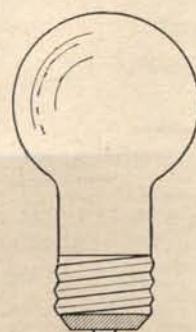


FIGURE 3—Mogul (large) base bulb.

YOU MAY contend that bulbs, lamps and fixtures are not actually appliances. A moment of reflection, however, will reveal that bulbs and lamps of one type or another often are part of appliance circuits. Various lighting fixtures, of course, are actually more of a necessity than many of the so called "essential" appliances.

At this point the more precise reader will detect a need for establishing definitions. What is the difference, for example, between a light, a lamp, a bulb, a fixture, etc? Technical correctness and common public usage are often at loggerheads about many terms. Illustration: The powerplant under the hood of an automobile is actually an engine but even the men who work on them—from the one-pump gas station up to the motor car companies themselves—use the term motor very liberally.

With the devices whose purpose it is to emit light we also find a conflict between word usage and fact. The philosophers, in their wisdom, never solve any problem completely and thereby do not work themselves out of a job. Following this sage advice we shall set up definitions for purposes of this series but they are not guaranteed to solve the entire problem for all eternity.

Let us consider as **bulbs** those bulbous or tube shaped articles that are actually designed to emit light and screw, snap, or twist into a socket of some type. As **lamps** let us mean the bulb plus the socket, switch, decorative hardware and fasteners or stand required to make up an illuminating device which is not permanently wired to an interior outlet box in the house or not permanently affixed in one location. In this category, then, would be desk lamps, floor lamps, and pin-up lamps.

This, by default, allows **fixtures** to mean those complete illuminating devices which are permanently fastened and wired. Included as fixtures would be recessed lights as well as many indoor and outdoor nonrecessed types.

Do not lose sight of the fact that these definitions were set up for this series of articles to enable us to bring some order out of the chaos of confused usage prevalent today. It is highly improbable that we can get 100 per cent co-operation from the rest of the inhabitants of this

sphere as regards this usage. Do not, therefore, be startled by disputes from these nonconformists.

BULBS

EVEN IF we restrict the discussion of bulbs to those in common household use we still have a surprising variety of sizes, shapes, base types, voltages, wattages, etc. The electrical symbol for a common bulb is shown in Figure 1. The symbol is simplicity itself and allows one to assume that a bulb must consist at least of two contact points (terminals) each connected to one end of a filament. This is, of course, true and the next step is to see just what form these simple elements may take. Some bulb categories will be omitted in this section as they are less frequently used.

The most commonly used bulb base—as far as the average WORKBENCHER is concerned—is the Edison or standard base. As Figure 2 shows, this is a screw base bulb and the glass envelope usually takes the shape shown. The base is approximately one inch in diameter with the threaded portion forming one of the electrical terminals and the center contact forming the other. Bulbs with this type of base are usually available in 15, 25, 40, 60, 75, 100, and 150-watt sizes.

Mogul base bulbs have a 1½-inch diameter base. The shape of the glass envelope is also slightly different in that there is a more pronounced neck portion, Figure 3.

The regular Edison base is available with—and the Mogul base is primarily designed for—bulbs with three-way filaments. A three-way bulb is so called because three levels of illumination may be obtained from it. Depending upon the switch position one could select, for example, 50 watts, 100 watts, or 150 watts. Although there are exceptions it has generally been the practice to use Edison base three-way bulbs for up to 150 watts and Mogul base bulbs for wattages up to 300. The Mogul base three-way bulb sees considerable service in larger floor lamps where higher wattage combinations such as 100, 200, and 300 watts are desired. Mogul base bulbs, however, are available in 50, 100, and 150 watt combinations. Common Edison base three-way wattage combinations are 30, 70, 100; 50, 100, 150; there are some combinations that have a maximum of more than 150 watts.

Figure 4 shows the difference in the base end view between a regular bulb and a three-way bulb. Except for being larger than the Edison three-way base the Mogul three-way base appears no different.

Figure 5 is a schematic drawing of the inside of a three-way bulb. For purposes of explanation this bulb is assumed to be a 50, 100, and 150 watt combination. The 50-watt filament is connected between the ring and the shell and the 100-watt filament is connected between the center and the shell contact. When the three-way light switch is first turned on it causes current to flow between the ring and the shell (through the 50-watt filament), which gives the lowest level of illumination. When the switch is turned to the second position it causes current to flow between the center contact and the shell (through the 100-watt filament), which is the middle level of illumination. Turning the switch to its third position causes current to flow between the ring and the shell and also between the center contact and the shell (through both the 50-watt and the 100-watt filaments) for the highest level of illumination. The fourth or remaining switch position is "off." It will be noticed that the shell is the common terminal used in all cases.

THE QUESTION sometimes arises (among our more cautious brethren who have learned not to experiment with electricity) as to what will happen if a regular one-way bulb is used in a three-way socket or a three-way bulb in a one-way socket. You need not be without light for want only of a three-way bulb. When a one-way bulb is put in a three-way socket it will work—not, however, in all positions. It cannot work in the first switch position because this involves a circuit between the ring and the shell and as may be seen from Figure 4 the one-way bulb has no ring. It will work in the second and third positions of the switch as each of these positions involves a

circuit between the center and the shell. Having a one-wattage filament, though, it can have but a single level of brightness in either position. The possibility of having different illumination levels lies in the bulb and not in the switch which serves merely as a selecting device.

A three-way bulb can be used in a one-way socket provided that the filament which gives the medium amount of light is good. A moderate amount of cogitation reveals that this is so because the only circuit which can possibly work in this type of socket is the one between the center and the shell. This will be true regardless of whether the other filament is good or not. Temporary relief in mild cases of bulb-snatching has sometimes been had by using a three-way bulb in a one-way socket when only its lower wattage element was burned out.

Another common screw base type is known as candelabra. A popular bulb using this base is shown in Figure 6. This 7-watt type of bulb is used in some strings of Christmas tree lamps and also in night lamps, grinder lights, etc., (mfg. type C-7½).

The last category of bulbs (according to bases) that we shall consider here is the miniature bulbs. One way of classifying base types is "screw" and "no-thread." Of the no-thread types the bayonet base shown in Figure 7 is very popular. In appliance work you will usually find, however, that a bulb with a screw base approximately $\frac{3}{8}$ inch in diameter is used. Figure 8 shows a type of miniature bulb used as an indicator in a French-fryer circuit. This is a 1.2-volt (mfg. type 222) lens-end bulb which is also used in some small pocket penlights. The more faithful among you may remember that the subject of indicating lights in appliances was mentioned in the July-August, 1957, issue of WORKBENCH in the section on percolator type coffeemakers. Miniature 110-volt bulbs are not commonly made; therefore, existing lower voltage miniature bulbs are adapted for use in

these appliances by the use of circuits which properly limit the current flow through them.

BULB MARKINGS

IN ADDITION to the words that appear on the bulb end, there should be at least two sets of figures of importance. Most lighting systems are 110-120 volts. That is, the current is supplied under an electrical pressure of 110 to 120 volts by the power company. Bulbs are made, however, for the fewer number of 220-240-volt circuits which require bulbs. If a bulb designed to operate with an electrical pressure of 110 volts were placed in a 220-volt circuit it would burn out because twice as much current would be forced through it. If, on the other hand, a bulb designed to operate with an electrical pressure of 220 volts was placed in a 110-volt circuit it would be at best rather dim because only one-half of the required current would be forced through it by the lower voltage.

Have you ever asked friend wife what size (meaning intensity of illumination) bulb it was that just burned out and had her reply, "There's a 120 v on here, does that help?" Now let's not start any family

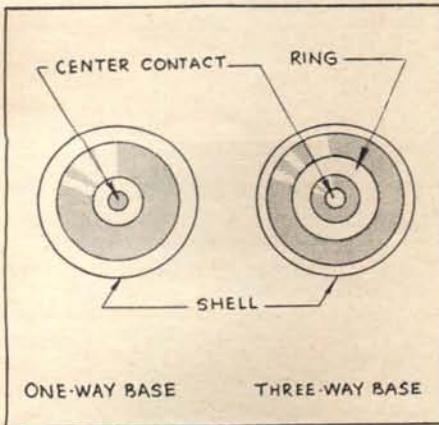


FIGURE 4—The base of a one-way bulb has two points of electrical contact while the three-way has three.

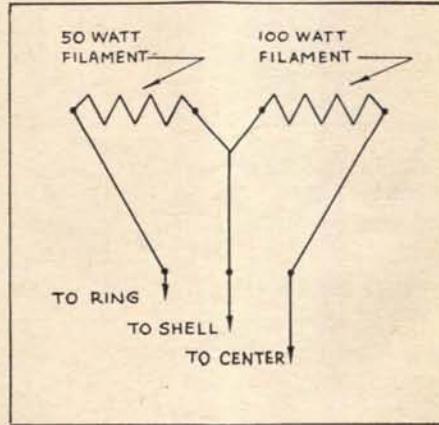


FIGURE 5—This three-way bulb filament would have a wattage combination of 50, 100, and 150.

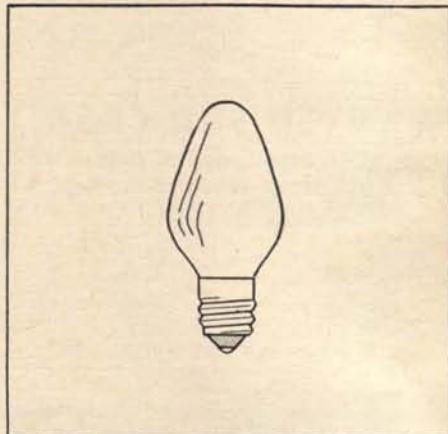


FIGURE 6—A popular bulb with a candelabra type base.

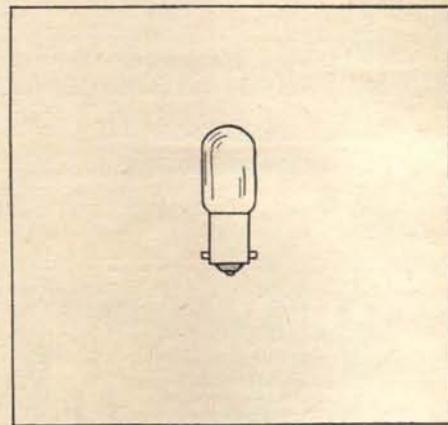
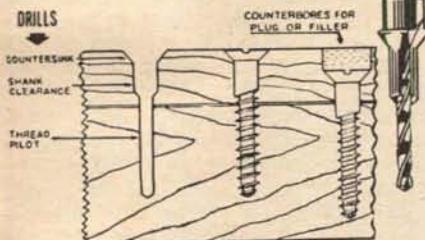


FIGURE 7—A bayonet base bulb.

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FIGURE 8—One type of miniature bulb with a screw base. This particular one has a magnifying end known as a "lens end."

fights because this doesn't prove that women are not as intelligent as men. It proves, rather, that not everyone understands all that he knows about the items that he uses every day. Most people do know that the higher the wattage of the bulb the greater amount of light it will produce; let us see why this is.

The watt is the unit of electrical power and it is power that you are charged for by the electric company. It is concerned with the wattage you use and the length of time that you use it. The product of this, watt-hours, is divided by 1,000 to produce the more workable term kilowatt-hours that appears on your electric bill.

Mathematically wattage is the result of multiplying the voltage (electrical pressure) in volts by the current (electrical flow) in amperes or amps. An appliance operating at 110 volts with a current of 2 amps flowing through it would be rated at 220 watts. The job of supplying the proper voltage belongs to the electric power company. If the user wishes to have a brighter light bulb he must change some factor, then, other than the voltage in order to utilize more electrical power. Although he may not know it, what he does is to buy a bulb with less resis-

tance (opposition to current flow) which allows more current to flow in the bulb thus giving a brighter light. This, then, is a higher wattage bulb. A 40-watt bulb gives more light than a 25-watt bulb because there is more current flowing through it although the voltage must remain the same—it is the resistance in the filament which has been changed. Figure 9 summarizes the definitions of the electrical terms under discussion.

Electrical appliances as well as bulbs are marked with the operating voltage and the wattage required. Some appliances are also marked with the amperage (current flow) under operating conditions. Voltage markings are important in insuring that the user does not ruin the device by connecting it to the wrong voltage source. Electrical devices are marked with their wattage rating in order to advise the user of the power that they will consume and also serve as an index of the work or output that may be expected from them.

FLUORESCENT BULBS

THUS FAR all of the bulbs that we have mentioned have been of the incandescent variety. This means that they produce light when their filaments reach a white heat. The fluorescent bulbs—which are either circular (ex.: Circline type fixtures) or straight tubes work on an entirely different principle.

Figure 10 shows the electrical circuit of a fluorescent fixture. It may be noted that while the bulb contains a filament, light is produced by current flowing through a gas instead of heating a filament to white heat as is the case with the incandescent type. Although the initial cost of fluorescent bulbs (commonly called tubes—but bulbs by our definition) is higher than the incandescent they do have several advantages. They represent a closer approach to actual daylight, produce better illumination with a smaller power consumption (lower wattage rating), and operate much cooler than incandescent bulbs.

TERM	DEFINITION	UNIT
VOLTAGE	ELECTRICAL PRESSURE	VOLT
CURRENT	ELECTRICAL FLOW	AMP
RESISTANCE	OPPOSITION TO ELECTRICAL FLOW	OHM
WATTAGE	ELECTRICAL POWER	WATT

FIGURE 9—Chart of electrical terms.

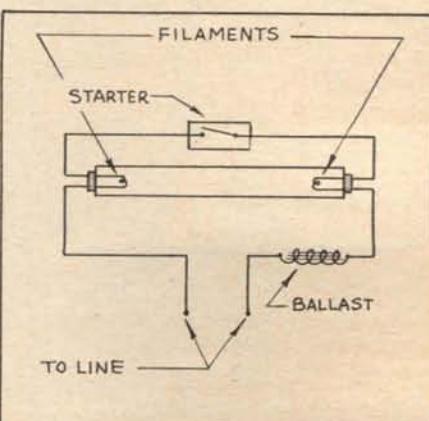


FIGURE 10—Units in one type of fluorescent circuit.

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The interior of the glass in the fluorescent bulb (tube) is coated with a chemical which glows or fluoresces when an electric current flows through the gas filled area. In reference to Figure 10 (which is only one of the types available) note that the fluorescent circuit also utilizes a starter and a ballast. Briefly the operation may be described as follows: 1. When the switch is closed current flows through the ballast, one filament, through the automatically closed starter and through the other filament and back to the source; 2. The filaments begin to heat as needed for proper operation; 3. The starter automatically opens and the ballast causes a momentary surge of high voltage; 4. This is sufficient to start an arc through the bulb from one filament to the other—a much lower constant voltage is all that is needed to maintain this arc once started; 5. As long as the switch is on this circuit remains in effect; 6. Another function of the ballast is to maintain current flow in the circuit at a value high enough to keep the bulb lighted but low enough to prevent damage.

The starter usually takes the form of a small aluminum can (see Figure 11) that fits into the fixture and may be concealed by the bulb. If this starter is defective, the fixture cannot be turned on. Once on, however, the fixture will not be affected even by the removal of the starter. Now naturally this will be true only when the starter can be removed without disturbing the bulb as is sometimes the case. The most frequent point of failure in a fluorescent fixture is the starter. If this happens, you will be pleased to know that replacement is not a difficult task. Starters are rated according to the wattage of the bulb they are to serve—be sure to use the proper one. Starters are now available with a reset feature. This type is designed to open the circuit like a circuit breaker if conditions are present that would ordinarily cause damage to a regular starter. Unless the starter does truly fail, then, operation may be restored by pressing the reset button.

Fluorescent bulbs have a double

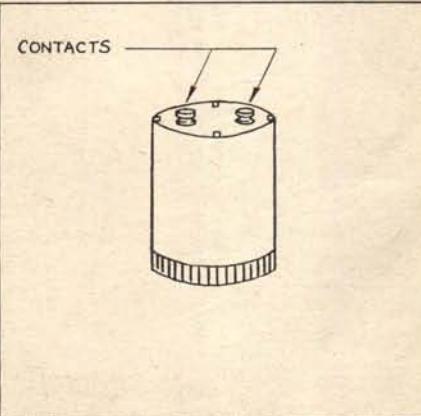


FIGURE 11—Fluorescent starter.

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set of pins on each end which must be properly engaged in the socket. Some fluorescent fixtures which contain more than one bulb may have their bulbs connected in series. If two bulbs are connected in series, for example, both will go out if just one of them would happen to have a poor connection or work loose in its socket. The series type of hookup is used in the older type of Christmas tree lamps. You know what I mean—when one goes out the whole string goes out so you start hunting!

CONFUSION sometimes causes lumiline fixtures to be mistaken for fluorescent. As may be seen from Figure 12 a sketch or even a casual glance will fail to reveal much difference between a lumiline and a fluorescent fixture. Lumilines were all the rage before World War II for installation at the sides or top of the bathroom mirror—just as many fluorescents are today. There, however, the similarity ends. The lumiline is an incandescent as it has a filament running the entire length of the bulb and it depends upon the white heat of this filament to produce light. Bulbs are available only in 40-, and 60-watt sizes. Neither the bases nor the bulbs themselves are interchangeable between the lumiline and fluorescent. If you like the long slim style of the lumiline but are dissatisfied with the light, your only choice is to replace the entire fixture with fluorescent. Fluorescents produce about three times as much light and generate only about one-fourth as much heat as incandescents for a given wattage.

Fluorescent lamps are available which are made to appear as fixtures. Maybe they are fixtures—except for our definitions. At any rate they look like regular fixtures but are plugged in instead of being permanently wired and attached, thus saving the installer considerable time and effort.

Lengthy discussion is not necessary to the understanding or repair of ordinary fluorescent troubles. If the starter does not cure the difficulty, check the bulb for good contact and,

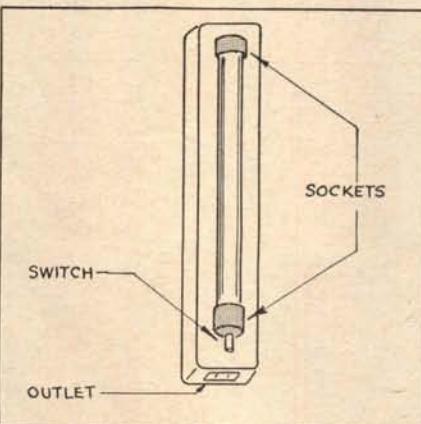


FIGURE 12—A lumiline fixture. Although of the incandescent type it resembles fluorescent fixtures.

of course, if necessary check the bulb by replacing with a different one. The bulbs do wear out and what makes the matter confusing is that bulb and starter malfunctions may both exhibit the same symptoms.

A rather large amount of space in this part has been devoted to bulbs because they are rather important items in our everyday lives. Furthermore, understanding their principles of operation and other details is essential to a good electrical background. Fixture installation and some lamp installation usually comes under the heading of house wiring and will not be covered here. Appliances, lamps, and fixtures have in common certain items among switches, sockets, etc., which should be understood by the home mechanic and which will contribute to his general fund of knowledge.

SOCKETS

AN ELECTRICAL socket is a device designed to hold—and make electrical contact with the bulb. Needless to say, the socket is an essential item whether it be used in the most expensive lamps and fixtures or in the drop cord type of illumination of gangster movie backroom fame. The regular variety of sockets give little difficulty. When the socket is combined with a switch as in many lamps the problem is usually with the switch but calls for replacement of the whole unit.

Figure 13 shows a standard brass socket with a push-through switch. Similar sockets are also available with the pull chain and key handle switches. Many people prefer the push-through type of switch on floor lamps and home project lamps—especially those that are not very heavy. The reason for this is that pulling on a chain may upset the lamp or at least be annoying. On gooseneck floor lamps pulling on the chain may change the position of the lamp which in turn demands a change in position of the user—an aggravating business to be sure.

Three-way lamp sockets for Edison base bulbs are similar to the one

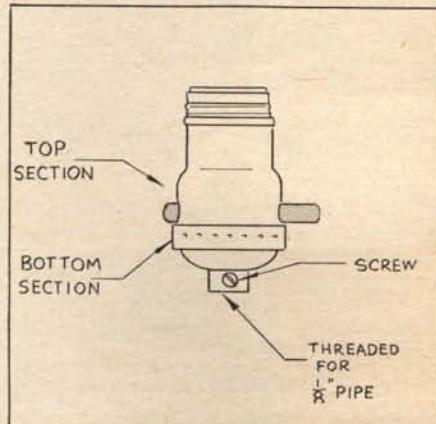


FIGURE 13—Standard socket with a "push-through" switch.

shown in Figure 13 except that the switch is of the rotary type and must provide for three positions of "on."

Note that the socket shell (Figure 13) is made in two pieces. This is to permit access to the inside for wiring the switch. The bottom of the socket is fitted to receive a $\frac{1}{8}$ -inch pipe. This knowledge is especially valuable when making your own lamps. Riddle time! — Question: When is $\frac{1}{8}$ inch not $\frac{1}{8}$ inch? Answer: When it refers to pipe diameter. It seems that neither the inside nor the outside diameter of this pipe measures $\frac{1}{8}$ inch. The outside diameter is $\frac{3}{8}$ inch and the inside diameter is approximately $\frac{1}{4}$ inch.

Bottoms are available made to receive $\frac{3}{8}$ -inch pipe. This pipe has an outside diameter of $\frac{5}{8}$ inch and is not as common as the $\frac{1}{8}$ -inch pipe. Lock nuts are made for use with both sizes of pipe to anchor them in place.

Because of the similarity of construction and the interchangeability of parts, changing types of switches is very easy. If the type of switch operation on a particular lamp socket of this variety does not appeal to you, it can usually be changed without disturbing the bottom—that is by removing only the top of the shell and the inside portion. Also a one-way lamp can easily be converted into a three-way or vice versa.

Figure 14 shows a device which may be used in the chain of a pull chain type of switch on both lamps and fixtures. The beaded chain is simply cut and the ends attached to the link. The link is made of an electrical insulator (nonconductor of electricity) and removes any chance for a shock that might be received under some conditions by touching the metal chain. This is an especially good idea in the bathroom or kitchen where wet hands increase the possibility of shock.

"Y" shaped sockets are also available into which two bulbs or electrical plugs can be screwed. The combination light socket and double current tap is a crony of the "Y" socket. Regular use of these fuse

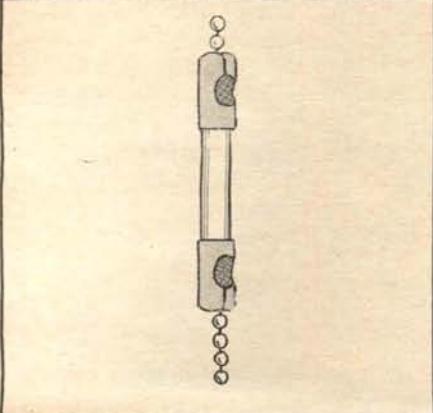


FIGURE 14—A nonconducting link which may be used in pull chains to eliminate the possibility of shock.

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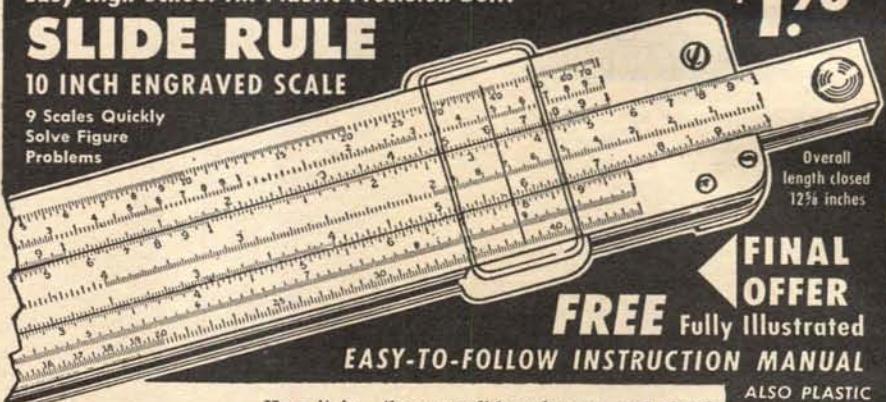
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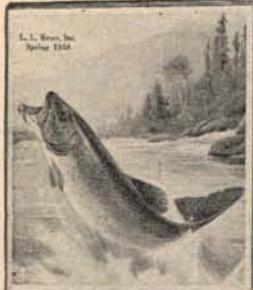
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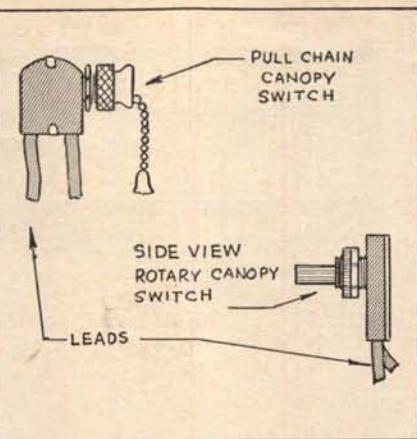


FIGURE 15—Two types of canopy switches.

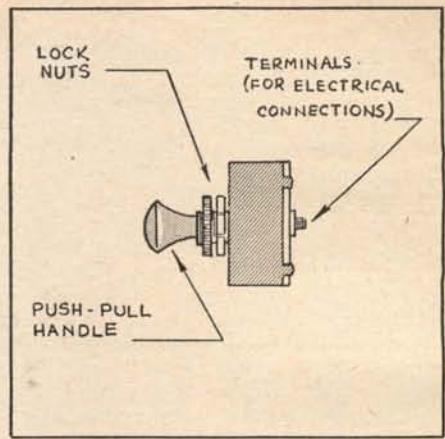


FIGURE 16—One type of push-pull switch.

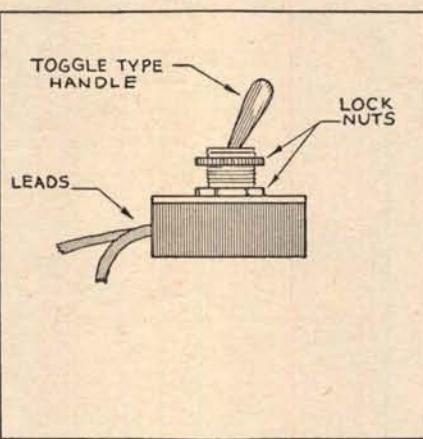


FIGURE 17—A midget toggle switch.

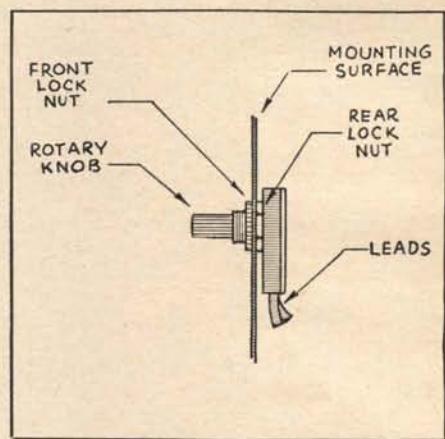


FIGURE 18—The mounting of a midget switch. In the above drawing some threads are shown exposed. This may be eliminated by placing the locknuts further forward, thus allowing the switch to sit farther behind the mounting surface.

impossible to fix these miniature switches.

The canopy switches (Figure 15) are the most compact of all. There are no external provisions for connecting wires to these canopy switches but they come with the leads already attached. Both the pull chain style and the rotary type are very popular. Some people find the rotary type objectionable because of the small stem size.

Push-pull switches (Figure 16) operate just as the name implies. The switch is "on" when the projecting arm is pulled out and "off" when it is pushed in.

The term toggle switch (Figure 17) is not exclusive with these midgets. A toggle switch is one that is operated by pushing the projecting arm up or down or from one side to the other. The common wall switch is another example of a toggle switch.

Figure 19 shows the application of solderless connectors or "wire nuts" as they are often called. When applied properly they will make a good mechanical and electrical connection. You may frequently see them in lamps or fixtures or you may wish to use them yourself in order to do away with the muss and fuss of

blowing aids should be avoided as they do not cure the basic trouble—skimpy wiring in the building—and people have a habit of overloading them beyond their capacity.

SWITCHES

THE HOME electrical mechanic has a variety of switches from which he may choose to aid him in his work. Among those common in lamps and fixtures are: canopy switches, Figure 15; push-pull switch, Figure 16; toggle switch, Figure 17. Because of their compact size these are generally considered midget switches. They require a mounting hole approximately $\frac{1}{8}$ inch in diameter and fasten by tightening two lock nuts. Figure 18 shows how these switches are mounted.

Care should be taken to note the voltage and amperage rating on these switches. Not all of these switches—even those that appear similar—necessarily have the same rating. Early failure may be encountered if care is not taken to use a switch adequate for the job. Large floor lamp wattage, in particular, may be larger than is suspected if not checked. When these switches go bad, replacement is in order. It is impractical and in some cases even

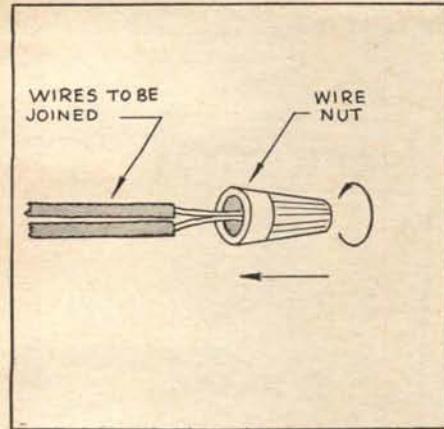


FIGURE 19—By turning clockwise and with forward pressure a wire nut can make a solid electrical and mechanical connection.

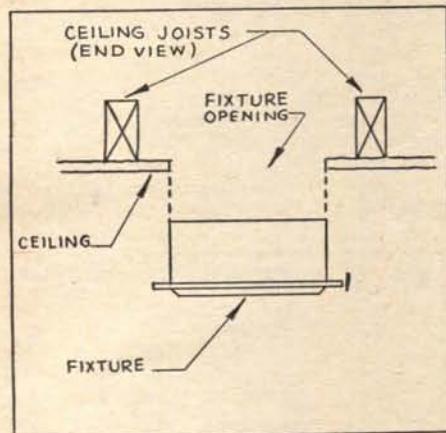


FIGURE 20—The bulk of a recessed ceiling fixture is concealed in the space between the joists.

soldering. They are also easier to remove should the need arise. These connectors are composed of a plastic cap containing a metal insert. You are usually cautioned about twisting the wires together before applying the connector. The reason for this is that the wire nut twists the wires as needed when it is applied by exerting a slight pressure and turning as you would a regular nut. Furthermore, these connectors are made in different sizes according to the size wire they are to be used on; twisting beforehand may require that a different size be used.

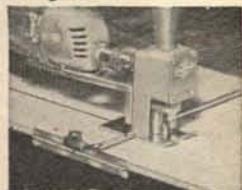
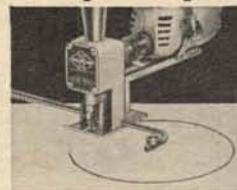
RECESSED FIXTURES

RECESSED CEILING fixtures take advantage of the fact that there is unused space between the joists in the ceiling (Figure 20). Regular fixtures are mounted externally and are fastened in various ways to an outlet box. When recessed fixtures are installed in a house that is already completed, care must be taken in cutting through the plaster or wallboard. Some types come complete with brackets for attachment direct to the joists while others must be "framed in," i.e., a wooden supporting frame built to hold the fixture to the joists.

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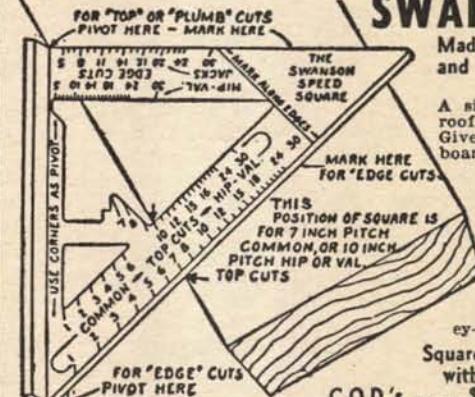
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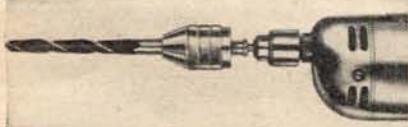


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cessible for repair than fixtures. In time, of course, lamp cords become worn and need replacing but aside from this and some structural defects caused by use, the major complaint with table, pin-up, and similar lamps is the switch. Floor lamps, although more complex, suffer from the same maladies. Because their cords are continuously in contact with the floor and subject to a variety of misplaced feet this point must be watched rather closely. Constant vibration from the floor is often the cause of bulbs working loose in their sockets and even internal connections becoming loose. Successful servicing of a floor lamp often depends largely on mechanical ability. In replacing most switches, for example, it is necessary to get at the switch from the inside. It is sometimes a mystery as to exactly how some lamps are put together. Remove all breakable items before working on the lamp. You may be hard put to get a duplicate for a broken light diffuser or such and your wife will never settle for less. Since there are so many different types of floor lamps no one procedure would cover the disassembly of all. A multiple light floor lamp usually represents a fair investment and so its maintenance and repair should also rate a fair portion of reason and attention.

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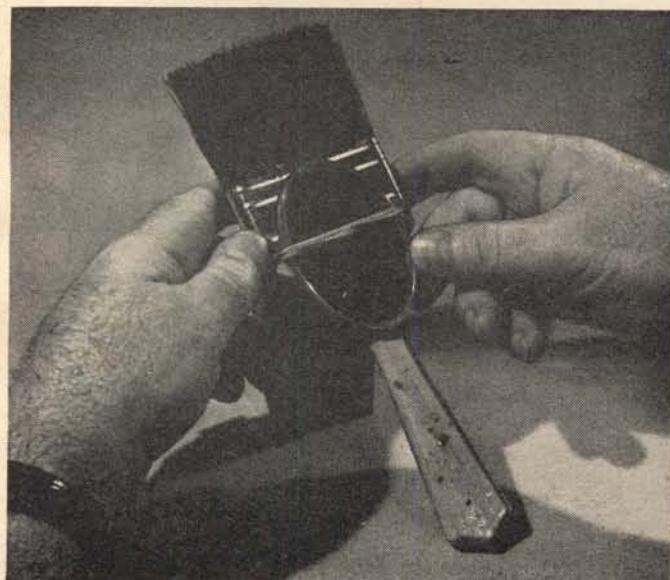
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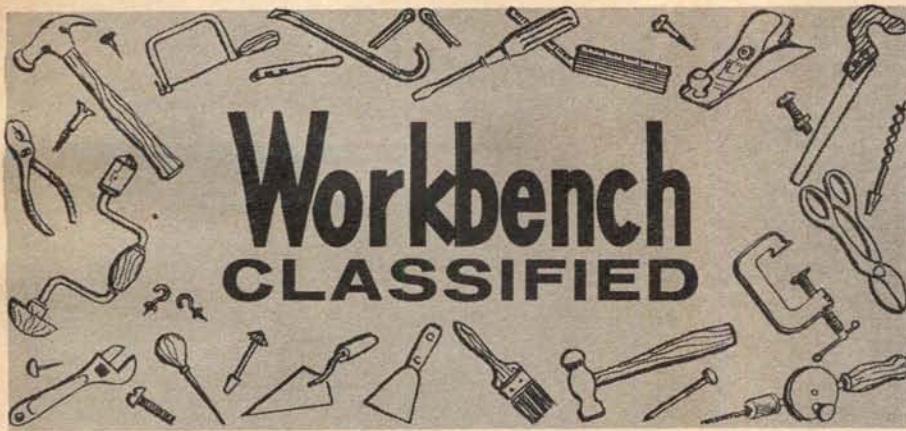
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This Might Help

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I have found a test for dryness that I use before painting any basement walls. I fasten a 10-inch square of clear cellophane to the wall to be painted. I use Scotch tape or masking tape for securing the patch to the wall and care is taken that the patch is securely fastened on all sides. I then leave this patch for a couple of days and at the end of that time, if the patch is still dry on the side that is against the wall, the wall is dry enough to paint. If any moisture is present on the patch, your paint job will only be a waste of time and money.—Howard E. Moody

Gripping Small Drills

Everyone working with tools, from professional to piddler, has probably experienced the frustration of watching small drills, $\frac{1}{8}$ " and under, spin loose in drill chucks and shatter. Besides the resultant spoiling of work and the inconvenience of rushing out for a replacement, a spinning drill can score up chuck jaws destroying concentricity and so doing major damage. To overcome this problem once and for all, take a length of bell or other soft raw wire, wind it tightly around drill shank using the shank as spool. Snip off superfluous wire and close jaws firmly on wired shank. Now the pressure on individual jaws is distributed over a much wider surface of drill-shank. The result is greater efficiency, reduced drill breakage, and protection to chuck jaws by well gripped drills.

Albert Ujcic

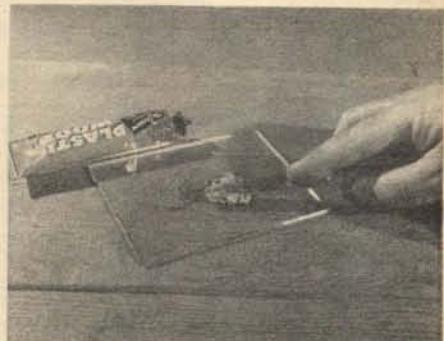
To Drive a Nail into Plaster

Often it is necessary to drive a nail into a plastered wall to hold pictures, shelves and the like. First, drive the nail into the plastered wall, wherever you want it. Sometimes a lath is pierced and the nail holds. Sometimes, even in pure plaster, the nail holds satisfactorily. In these events you are all right. Nothing more is necessary. But, in many instances, the nail makes a large and nonholding hole. The thing to do then is to pack the hole full of plastic wood, with nail in precisely the position, where you want it. Then when the plastic wood hardens you will have a nail that will do the trick. Don't pack the hole full of plastic wood and then try to drive the nail through the hardened wood. You will then simply knock the hardened wood through the former hole, thereby making the hole still larger.

W. F. Schaphorst

Plastic Wood Made into Metal Putty

When metal surfaces do not have to undergo mechanical strain, plastic wood can be used as a putty for filling holes and dents and becomes almost undetectable. Just put a sufficient quantity of the plastic on a sheet of glass or metal and mix in enough aluminum bronze powder to give it a good metallic color. Mixing must be done quickly before the solvent evaporates, or a little lacquer thinner or fingernail polish remover may be added to restore the consistency.—Ken Murray



Sponge Pad File's Tip



To keep your thumb and the tips of your fingers from chafing and becoming sore when hanging on to the tip of a file, pad the tip with a small sponge folded over the end. You'll be surprised how much more comfortable this is than to hang on to the bare tip itself. The sponge is also useful to pad the tip of a wood rasp in the same way.

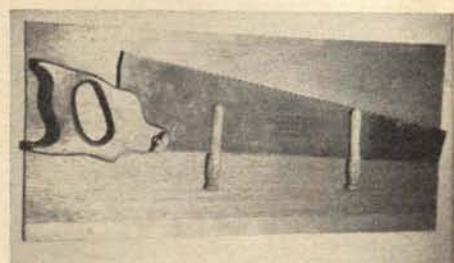
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Handsaw Rack from Clothespins

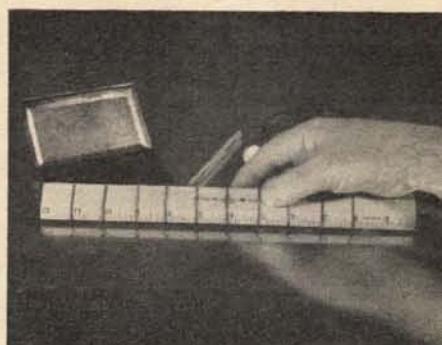
Make a wall rack for your handsaw from two common clothespins and a piece of plywood. Drill small pilot holes in the body of the pins to prevent the nails from splitting them, and nail them to the board near either end of the saw blade.

If desired, you can dispense with the board and nail the pins directly to your bench or the workshop wall.

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Guide for Spaced Holes



When it is necessary to lay out a number of similar pieces of work, wood or metal, for drilling a number of spaced holes, use a spacer-stamp. This is a ruler having a number of small rubber bands spaced on it as required and it is used with an ink pad like a rubber stamp. Apply the ruler to the work to be marked with a light pressure so that the ink dots will be small. The method also serves to mark plastic, rubber, paper, hardboard, etc., and can be used as a means of spacing before ruling parallel lines.—Ken Murray

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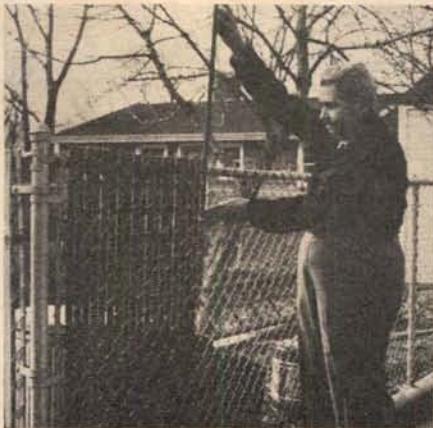
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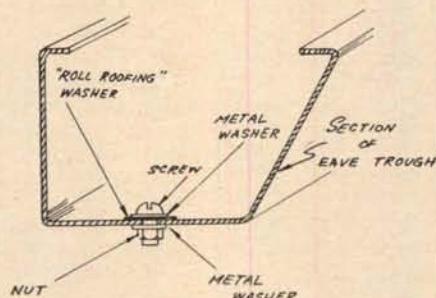
Ted Morgan

Painting Hints

IN ADDITION to spreading several layers of newspapers on the floor when painting chair or table legs, I place a shallow jar lid under each leg. This keeps the painted leg from sticking to the paper.

Blanche Campbell

Screw Repairs Eave Trough



An easy and permanent way to repair small holes which develop in eave troughs is to use a screw of appropriate size, together with metal and fiber washers, or a washer cut from a piece of roll roofing paper, clamped tightly, making the hole leak proof.

R. S. Howard

Sylvia's Designs
in full color \$1.00 each
with instructions
"Decorator for China"
\$3.00
Send for FREE Catalog
Dealer Inquiries Invited
SYLVIA'S CHINA STUDIO,
Dept. PH
Box 463, Klamath Falls, Ore.

"TI-NEE" BATTERYLESS TUBELESS LIFETIME RADIO

"Ti-nee" Radio is Guaranteed to work for your lifetime! Uses no tubes, batteries or electrical plug-ins. Never runs down! Smaller than a pack of cigarettes! Receives long distance calls anytime, anywhere without extra antenna. Uses crystal diodes, Hi-Q Tuner. Beautiful black gold plastic cabinet. Built-in speakerphone. **SEND ONLY \$2.00** (bill, ck, mo) and pay postman \$4.99 COD on arrival or send \$6.99 for postpaid delivery. **SEND COMPLETE READY TO LISTEN—NOTHING EXTRA TO BUY EVER!** Extra long distance calls included for stations up to 1000 miles away! Available only from Midway Co. Dept. GW-4 Kearney, Nebr.



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Start your own business at home. Cast plaques, novelties, figurines, ash trays, statuettes, book ends. Make your own flexible molds. Also make garden vases, bird baths, window boxes, sun dials, pottery, etc. Write today for free sample and details.

H. Tooker, 1045-F Fairview Ave., Hamilton, Ohio

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48 attractive, easily made projects that boys from 8 to 12 will have fun making from scrap material. Included are novelties, toys, games, bird houses, windmills, etc. Complete directions and full size patterns. Excellent for youth leaders and Dear Mothers. Only \$1.00.
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5 YEAR OLD COLORADO BLUE SPRUCE

\$1 ea
Northern grown, Bushy Trees

(In lots of 5)
These trees are so beautiful you'll hardly believe your eyes when you see them delivered at your door this spring. Not tiny seedlings, but 5 year old trees. WILL ADD REAL BEAUTY AND VALUE TO YOUR YARD FOR YEARS TO COME. Every tree is northern grown, extra nice, well-grown. Planting instructions included.

Postage extra on unpaid orders. C.O.D.'s welcome. Limited offer—no plants written off. Tree \$5. Orders for less than 5 are \$1.25 per tree—minimum order two trees. The more you order, the more you save—10 trees for \$9.50, 20 for \$18.00.

MONEY BACK GUARANTEE

On arrival if you are not 100% satisfied simply return for money back.

**FAMILY GARDENS NURSERY SALES CO.
1621, DOWNTOWN GROVE, ILL.**
 2-\$2.50-\$1.25 ea. 5-\$5.00-\$1.00 ea.
 10-\$9.50-\$4.75 ea. 20-\$18.00-\$9.00 ea.

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AMAZING BLOCK & TACKLE

- PORTABLE . . . weighs only 13 ozs., fits in pocket!
- ONE HAND OPERATION . . .
- POWERFUL . . .

LIFTS UP TO 1000 LBS.!

Amazing Work Saver For

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- Yachtmen
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- Farmers
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Here's an unusual tool, even for us! It's the tiny Midget Babe Block & Tackle. It weighs only 13 ozs., yet is so powerful, it lifts up to 1000 lbs. easily! Because of its great strength, small size, complete portability—this block & tackle has many uses. In your car for emergencies, for home, factory, farm . . . for loading heavy articles. For sportsmen: loading deer, boats, etc. For anyone who has to do heavy lifting! Finely engineered throughout, best grade aluminum, steel axles, pre-lubricated for life. Hoists have two lifting slings, at top and bottom, with heavy welded steel rings. Slings can be doubled for extra strength. Complete with 60 ft. nylon cord, 5 to 1 \$9.95 ratio—1000 lb. test. Carrying bag. Instructions . . . ppd.

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\$12.95 ppd.

1 yr. guarantee on both models

11-Pc. DRAFTING SET \$3.00

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High lustre chrome plated instruments of outstanding quality and accuracy. Set includes Plain and Ringhead Bow Dividers, Compasses for use with ink or pencil, Ruling Pens and all necessary parts. Packed in a velvet lined, snap button closure, simulated leather case.

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Now—siphon any liquid automatically, safely, WITHOUT putting tube to mouth! Squeeze bulb, liquid starts to flow immediately! Transparent sections let you see liquid flowing! Siphons, pumps gasoline, water, any liquid. Even acids, corrosives! For cars, boats, power mowers, campers, plumbers, doctors, chemists, factories! Acid resistant. Over 7 ft. long!

ALSO AVAILABLE—Heavy Duty Siphon, **\$2.98** ppd. $\frac{1}{2}$ diameter tubing, 8 ft. long.

Surgical Steel—Hand Ground

Set of 12 CARVING KNIVES

The sharpest, keenest ground, surgical steel blades we have ever

ppd.

seen—sharp enough to split a human hair in two! 12 different shapes and edges can do every job of wood carving, model making, linoleum cutting, sculpting and whittling imaginable. Each blade has a $\frac{1}{2}$ " long hardwood handle for easy gripping. Heavy duty blade is firmly attached by means of a brass ferrule to insure long, continued rugged use. Each surgical steel blade precision hand ground to easily and quickly notch and cut any shape you wish. A sensational all-purpose set, well worth \$5.95.

Save Hundreds of Dollars in Repairs

OKUN'S PLASTIC METAL



Applies Like Putty . . .

Hardens Like Steel . . .

. . . In Minutes!

Any break, crack or hole in metal, glass, wood, plastic, concrete, stone, cement or porcelain can be repaired in a jiffy by applying putty soft Plastic Metal—and in 40 minutes it hardens into a rigid steel-like solid that can be sanded, filed, sawed, drilled, machined and buffed to a gleaming lustre. Can't rust! Adheres to ALL surfaces with amazingly strong bond. Perfect for repairing leaks in pipes, boiler, fuel tank, car radiator, boat hulls; cracks in motor blocks, fenders, lamps, jewelry, toys, bike, sink, etc. No house, shop or plant can afford to be without it!

Add 15¢ to each for pp. & hdg.

3 oz. jar **\$1.00**

6 oz. jar **\$1.95**

2½ lb. can **\$5.95**

21 HIGH SPEED DRILLS \$2.50

Brand New! Top Grade! U.S.A.

Full Range from 1/16" Through 1/4"



Less Than 12c Each

Here's the greatest drill value we have ever offered! Precision crafted HIGH SPEED STEEL DRILLS made right here in the U.S.A., unconditionally guaranteed to easily, cleanly and speedily drill through the hardest steels or any tough metals and, of course, plastics, aluminum, wood, etc. These are not cheap carbon drills that dull after a short time, but top quality, full jobber-length shank drills with keen cutting edges that will give you perfect performance every time! Imagine! You get 21 drills—all most-used sizes from needle-sized 1/16" through 1/4"—ideal for industry and home—for use with portable or fixed electric drills.

If you can buy these drills for less than \$10.00 at any store, keep one of the drills for your trouble and return the rest for a full refund!

**CLOSE-OUT SPECIAL
SAVE \$4.55 on ARCO-SAW**

REG. \$12.50—OUR PRICE **\$7.95**

with Precision Graduated Depth—Bevel—Rip Gauges—5" Arco Safe-cut blade.

Easily attached in less than a minute to any $\frac{1}{4}$ " electric drill, this sensational gear-driven saw attachment will go through 2x4's in one cut—8 times faster than a handsaw! The 5" Sawblade will smoothly and rapidly whiz through lumber, plywood, wallboard, etc. with precision graduated DEPTH & LEVEL GAUGES for cuts to $\frac{1}{4}$ ", bevels from 0 to 45 degrees; ADJUSTABLE RIP GAUGE; ADJUSTABLE VISUAL GUIDE; sturdy, easily adjusted SAFETY YOKE; WORM DRIVE CLAMP; RIGHT ANGLE GEAR DRIVE; ONE-PIECE GEAR BOX with steel gears and self-lubricating LIFE-TIME BEARINGS: Arco-Saw uses 30% less power; blade easily removed and resharpened with ordinary hand file; ideal for rip, crosscut, mitre, dado and bevel cutting. Limited quantities at this LOW, LOW price.

Durex HOLE SAW

with exclusive new
Automatic SLUG EJECTOR

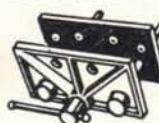
4 Hole Saws in 1

Fits any electric drill, drill press, lathe, motor. Automatic slug ejector pops out slug immediately. This saw works 3 times as fast as other hole saws that sell for twice as much! Cuts 1", $1\frac{1}{2}$ ", 2" and $2\frac{1}{4}$ " holes, cleanly, accurately. Cuts wood, plastics, metals, formica, wall board, etc. Has extra grooves in tool head to accommodate $1\frac{1}{4}$ ", $1\frac{3}{4}$ " and $2\frac{1}{4}$ " blades. Consists of sturdy alloy tool head, 4 finest quality shatterproof blades, automatic slug ejector ONLY **\$4.95** plus 35¢ pp. & hdg.

REVOLVING LEATHER PUNCHES

- Housewives
- Schools
- Hobbyists
- Children
- Leather Workers

Makes clean, sharp holes—6 different sizes—in all qualities, thicknesses of leather. Use in the home for punching holes in belts, shoes, bar straps to tighten them. Repair baseball gloves. The kids will use it to make wallets, belts at home, in arts and craft classes. At this low price, an ideal buy. 9" long, with polished knurled handles, strong spring, 6 standard tubes, brass anvil. New German Import!



20 CAMEL HAIR BRUSHES

Close-Out—Only 5¢ each

Precision crafted in West Germany. Perfect for artists, touching up around house, cleaning electrical and optical instruments and guns. Sizes range from fine #1 to full #5. Select camel hair firmly set in metal grip to give years of use. Worth many dollars but ALL **\$1.00** Ppd.

**FREE! + ALL PURPOSE BLADES (A \$1.40 Value)
ONE YEAR FACTORY GUARANTEE!**



**Easy Light, Windproof, Rainproof
Emergency FLARE KIT**

No car owner can afford to be without a flare kit—it may save your life and the lives of loved ones if stalled on the road for any reason. Kit contains 3 FULL HOUR easy lighting windproof, rainproof flares plus extinguisher. Brilliant flares can be seen for several hundred feet—can be reused time and again! Also ideal as a source of warmth for winter play; for lighting camp fires or barbecues; a source of emergency light or cooking; guide light through dark areas. **\$1.00** Safe and easy to use. Compact.

plus 15¢ pp. & hdg.

Set of 10 Magic Magnets

These powerful, permanently magnetized magnets—each the size of a jelly bean—lifts over $\frac{1}{2}$ pound! Sewn into pot holders, towels or shower curtains makes them securely cling to steel. Holds items on dashboard, metal files, demonstration or bulletin boards. Recover items from hard-to-get-at places. Pulls through glass, wood, paper, leather, plastic—anything but iron. All 10 rustproof magnets.

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Send check or M. O. If C.O.D., fees extra. Money Back Guarantee.

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**Latest Model! Heavy Duty!
3½ AMP
½" SKIL DRILL**

"Breezes Thru" BIG Drilling Jobs
Reg. \$44.95—OUR PRICE **\$29.95**

Designed for professional craftsmen who want a longer-life, trouble-free, heavy duty drill that will go through the toughest of woods and metals! The Skil $\frac{1}{2}$ " drill is big and powerful yet lightweight and easy to handle. Has a power-packed motor for drilling up to $\frac{1}{2}$ " on steel; one inch in hardwoods. Used with holesaws for cutting up to 3" diameter holes. Low spindle speed provides the high torque to handle tough drilling jobs in heavy metal and lumber. Detachable handle gives extra control. Features switch with "ON" button, spring loaded for automatic shutdown—button for sustained drilling; powerful 3.5 amp. Universal AC-DC motor up to 60 cycles; geared chuck and key; lightweight housing; 115 Volt; 500 RPM; 12½" long; weighs 7½ lbs.; UL approved.

**A "Must" for Every Homeowner
4½" SKILSAW**

A versatile, budget priced saw with all the power needed for sawing jobs around the house. Zeros its way through plywood, wallboard, tongue-and-groove board and many other materials. Features positive depth and bevel adjustments; automatic telescoping blade guard; large supporting foot. Cuts 1 5/32" in depth and 1" bevel at 45 degrees. Universal AC-DC motor up to 60 cycles; 3050 RPM. Has fully enclosed momentary contact trigger switch. Blade guard has safety retractor handle.

\$24.95
plus 50¢ pp. & hdg.
6½" Professional SKILSAW—Same as above but with lots more power, friction clutch, full H.P. motor, 5800 RPM.

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Famous Shop-King Portable JIG SAW

Snaps on to any $\frac{1}{4}$ ", $\frac{5}{16}$ " or $\frac{3}{8}$ " electric drill in seconds. Does work of Jig, Keyhole, Coping, Rip, Crosscut, Band and Hack saws. Cuts intricate patterns, circles—no matter how large—in plywood, plastics, metal—even cuts 2 x 4's. Starts inside holes without boring. Self-lubricating bearings. Built-in automatic air blower. Easy to handle because of its right angle drive. Strong safety yoke and worm drive clamp make it vibration-proof. Extra large shoeplate assures accurate and square cuts.

\$8.95
plus 35¢ pp. & hdg.

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20 CAMEL HAIR BRUSHES

Close-Out—Only 5¢ each

Precision crafted in West Germany. Perfect for artists, touching up around house, cleaning electrical and optical instruments and guns. Sizes range from fine #1 to full #5. Select camel hair firmly set in metal grip to give years of use. Worth many dollars but ALL **\$1.00** Ppd.

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Emergency FLARE KIT**

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plus 15¢ pp. & hdg.

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These powerful, permanently magnetized magnets—each the size of a jelly bean—lifts over $\frac{1}{2}$ pound! Sewn into pot holders, towels or shower curtains makes them securely cling to steel. Holds items on dashboard, metal files, demonstration or bulletin boards. Recover items from hard-to-get-at places. Pulls through glass, wood, paper, leather, plastic—anything but iron. All 10 rustproof magnets.

plus 10¢ pp. & hdg.

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BANKRUPT,
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BUYS SUCH AS THESE!



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- \$2.50 Wallets, 30c each.
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- D.E. Razor Blades, \$1.50 per 1000 blades.
- \$1 Mufflers, Scarfs, 12½c each.
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